

Flight, November 9, 1912.



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A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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EDITORIAL COMMENT.

The Model Aeroplane and its Place in the Movement. In last week's issue of FLIGHT we made brief Editorial reference to the Royal Aero Club's generous offer of prizes to the model section in connection with the Aero Movement. Show to be held in February next. It has since occurred to us that the whole subject of the model aeroplane and its development is one that deserves a great deal more attention than is usually bestowed upon it. Not that this idea is one that is new to us—there is earnest of the serious way in which we regard the model in the amount of space we have always devoted to it in FLIGHT and the constant endeavours we have always made to encourage the model movement. There is, however, much more to be said for the model than we ourselves and others interested in the development of aviation have hitherto committed editorially to cold print, whatever we and they may have thought.

To begin with, the model aeroplane is emerging rapidly from the stage of the "flying-stick," even if it is not possible to say that it has already left that quite behind. The "flying-stick," as it has been aptly termed, had its uses, even though at its very best it was nothing but a toy. It served to create what we may term a preliminary interest in the problems of

mechanical flight in the minds of those who used it merely as an end to simple amusement. Man is essentially a competitive animal, and the "flying-stick" undoubtedly led to the evolution of something better than the simplest form of model flying machine, because it was inevitable, once it had become popular, that its individual users should be impressed with the idea that they must go one better than their neighbours. Thus it started a line of investigation which necessarily resulted in improvement, crude at first, but in its later stages partaking quite of a scientific nature. It led people to realise that the problems of flight were, within reasonable limits, precisely identical whether the machine was a full-powered aeroplane or merely a model driven by an elastic motor; that the same forces were at work in both cases; and that if the model was to succeed beyond the limitations possible to the flying-stick, its design must be approached with almost the same care and attention as that of the aeroplane itself. This, we quite admit, is a little exaggerated as a statement of the case, but not so much so as the casual thinker might assume. However, that perhaps may be allowed to pass, inasmuch as it is necessary to thus slightly exaggerate in order that the full significance of the model in its bearing on full-sized design may be fully appreciated. It will scarcely be gainsaid that the model in its latest and most scientific form is really and truly an aeroplane in miniature. Now all this evolution could not obviously have taken place unless those engaged upon the development of the model had been really interested in dynamic flight and its problems. Many, no doubt, fly model machines purely for pastime, but we cannot help thinking that the majority of the adherents of the model section have a deeper interest than that of mere amusement. From that point of view alone the model is an exceedingly valuable adjunct to flight. Times almost without number we have insisted in these columns that it is essential to us as a nation that the man in the street should be educated up to a knowledge of the powers and possibilities of the aeroplane in order that he may be able to take an intelligent view of its bearing upon the problems of national defence. It would be a long road to travel if we had to trust to his individual first-hand acquaintance with actual man-flight, and it is here that we think the scientifically-constructed model must have some little educational value in preparing him for an understanding of the larger aspects of actual flight. True, it may not go very far in this direction, but we do think it has at least something to say.

Again, it is a natural step from the model to the glider and the records are full of the names of those who, beginning with the model, have gone on to the more ambitious motorless machine. Here, once more, we see the educational value of the model, for it is quite safe to say that by far the larger number of those who have graduated in the manner indicated would never have taken to gliding experiments had they not first become fascinated by the study of the miniature machine. From the glider to the power-driven 'plane is simply another step in normal progression. Another point to be laid to the credit of the model machine is one that is not often publicly referred to. Much of the early flying of models was done—and, as a matter of fact, is still done, by the younger generation. The result in many cases has been that their elders have become interested to a degree which has enlisted them to assist in the improvement of the first crude types and some of the most scientific models of the day have been evolved by these elder converts to model flying. This, once more from the educational point of view, is all to the good of the movement, not only in its relation to the miniature flying machine but in its higher aspects. In fact, we think that it is scarcely possible to exaggerate the value of the model section as a popular educator.

There cannot be any doubt as to the popularity of the model. It is only necessary to refer to the pages of FLIGHT which are devoted to the interests of the model section to grasp fully with what an intense interest its development is followed in all parts of the country. Moreover, what pleases us most in this connection is the obvious fact that this interest is a progressive one, not only from the point of view of its becoming more widespread but from that of the increasingly intelligent manner in which the movement is approached by those associated with it. The much more solid and interesting reports which reach us from the clubs—especially since we decided to make these a monthly instead of a weekly

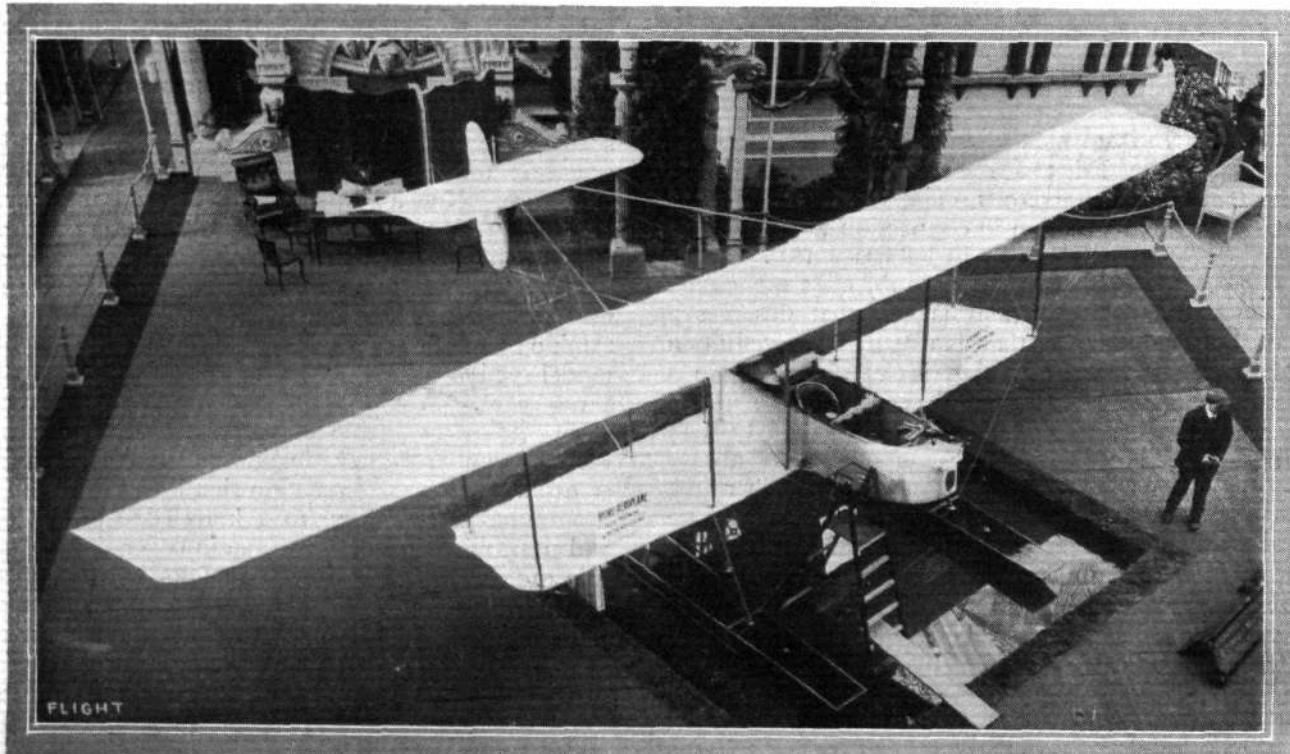
feature of FLIGHT—are quite sufficient earnest of this. There is much more that could be said on this subject of the model aeroplane, but we think we have made good the case for its possession of a distinctive value of its own as a part of the great aviation movement.

The Royal Aero Club's action is important mainly from the point of view of encouragement, and as a mode of encouragement it is all commendable. There is nothing like a prize to stimulate interest, but prizes of this magnitude do not go begging every day. In our own province we, too, have done what we can to encourage the model builder, and of late, as our readers know, have added the stimulus of the prize element into our model correspondence. Model readers who send in communications that are more than usually meritorious or interesting stand a chance of winning one of our certificates of merit, which is accompanied by a small prize. Intrinsically it is a matter of small account, but it is there to be won weekly by those of our readers who care to make the effort, and who succeed in themselves carrying out the spirit of the scheme by communicating such matters of information as will of themselves serve the purpose of encouraging others. It should be remembered that there is no intention of distributing Flight Certificates of Merit broadcast—rather the reverse, so that the more value may be attached to them by those who have for their work received such recognition.



Technical Report of the Advisory Committee.

THE Technical Report of the Advisory Committee for Aeronautics for the year 1911-12 is published with appendices by H.M. Stationery Office, at the price of 11s., and is about the best value for money that anyone is likely to be able to find in book form who happens to be interested in the science of aviation. It is a volume of over 300 pages, and contains contributions by most of the eminent men of the day who have set their minds on this subject.

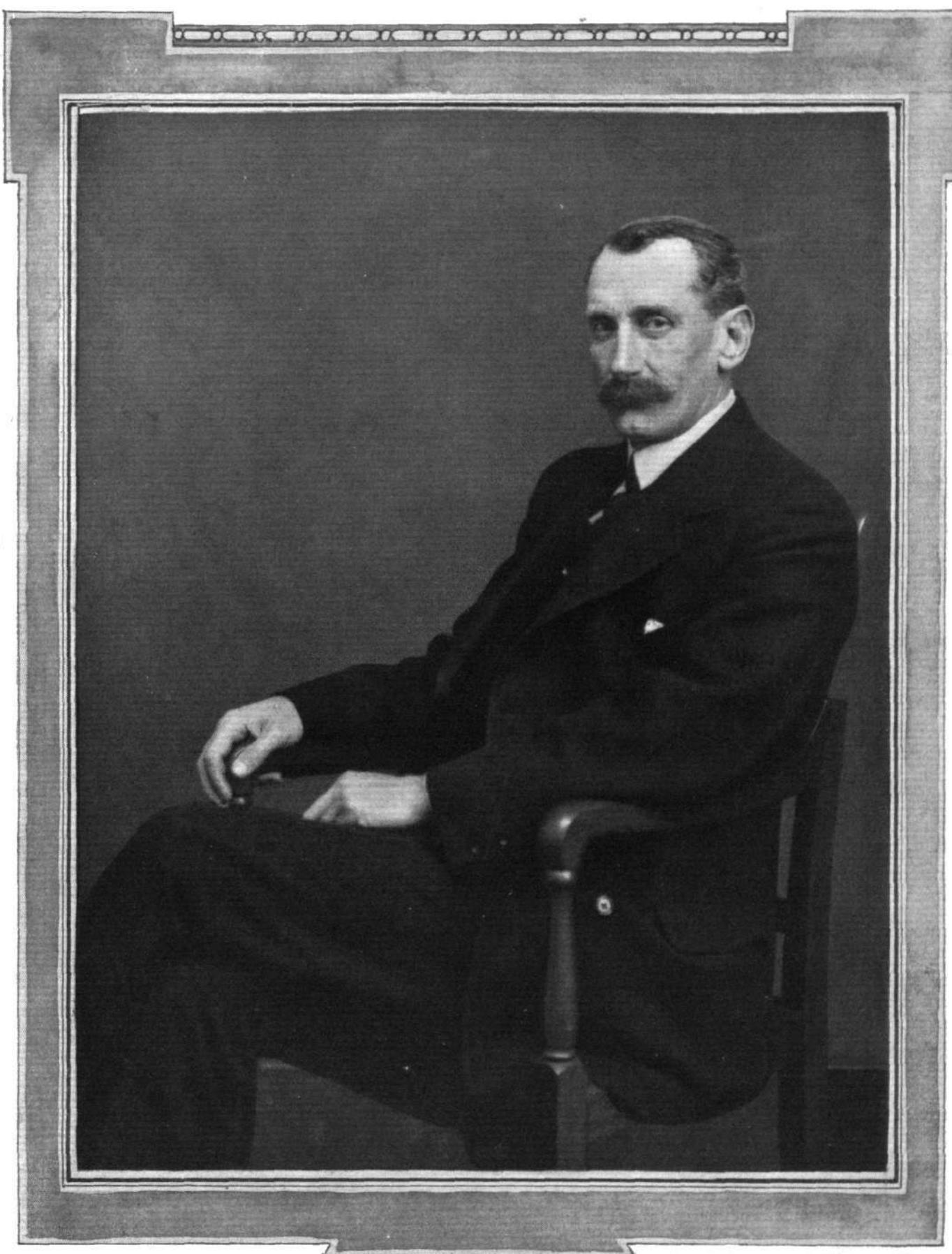


A novel way of exhibiting a hydro-aeroplane. Henry Farman's machine resting in its turf-edged water tank

NOVEMBER 9, 1918.

FLIGHT

MEN OF MOMENT IN THE WORLD OF FLIGHT.



"Flight" Copyright.

Director of Military Training. Royal Flying Corps: Brigadier-General D. C. B. HENDERSON, D.S.O., C.B.

HENDON FIRST NOVEMBER MEETING.

HAVING repented of its bad behaviour on the previous meeting, the weather more than made up for its shortcomings on Saturday last, which was ideal for flying; there was little, if any, wind, so that the machines were very steady in the air, and were impressively picturesque against the evening sky. In spite of a touch of cold, a decent gate resulted, demonstrating that the popularity of these meetings is now well established, thereby justifying the decision of the management to continue them throughout the winter. By way of an overture to the proceedings, J. L. Hall and Sydney Pickles arrived from Brooklands on their respective machines, having flown there together in the morning before lunch. Hall on his Blériot made the return journey in 25 mins., while Sydney Pickles with Lieut. M. W. Noel—a member of the Ewen School—as passenger, on the 60-h.p. Anzani-Caudron biplane, took 31 mins. Before the competitions started, numerous exhibition flights were put up, the first being Louis Noel on the 70-h.p. "Wake up" Farman; he being followed by Marcel Desoutter on the Blériot. R. T. Gates then took over the "Wake up" Farman and proceeded to wake up his audience a bit with some fine evolutions. Lewis Turner came out on the Grahame-White biplane, and Louis Noel (Father Christmas) got through some stunt flying on the 80-h.p. Farman. A fine, long flight was made by M. A. Richet on the 110-h.p. Canton-Unné Breguet biplane; he had a passenger on board and flew quite high, the engine keeping up a fearful din, audible even when the biplane was at its highest.

The Grand Speed contest provided three fine races and some very fast flying. Noel on the 80-h.p. Farman in the first heat covered the four laps in 6 mins. 49 secs., actually faster than the Blériot flown by Hall. The starters in the first heat were:—Lewis Turner, 50-h.p. Gnome-Grahame-White biplane, 1 min. 44 secs. start; Louis Noel, 80-h.p. Gnome-Henry Farman, 18 secs.; J. L. Hall, 50-h.p. Blériot monoplane, scratch. Noel came in first with Hall close behind, but both were eventually disqualified by the stewards for flying too close to Turner in overtaking him, so only the latter got a place in the final. In the second heat, Sydney

Pickles, on the 60-h.p. Caudron biplane, got 1 min. 22 secs. start; R. T. Gates, on the 70-h.p. Farman, 57 secs., and Marcel Desoutter, on the 50-h.p. Blériot monoplane, was at scratch. There was a fine fight for the first place between Desoutter and Gates, the former getting in by a bare 4 secs. The final heat of six laps resulted in a very close finish, all three machines coming in within a few seconds of each other. Desoutter, who was at scratch, slowly but surely overtook the other two—Turner, 50-h.p. "G.-W." biplane (3 mins. 30 secs. start), and Gates, who carried a passenger, on the 70-h.p. Farman (1 min. 34 secs. start). Turner came in second, 6 secs. behind, while Gates, who was much handicapped by his passenger, was last, 11 secs. behind Turner.

While the last heat was in progress, Richet again did some high flying in the Breguet, this time by himself, and after the speed contest Jules Nardini took up a lady passenger on the 60-h.p. Anzani-Deperdussin monoplane. Sydney Pickles also went up on the Caudron biplane, while Turner did some passenger carrying. Sunday afternoon was equally fine, and quite a lot of exhibition flights were made by the following pilots:—R. T. Gates and Louis Noel on the 70-h.p. "Wake up" Farman; J. L. Travers and Lewis Turner on the 50-h.p. "G.-W." biplane; Sydney Pickles and Eugene Galy on Caudron biplanes; Mrs. Stocks on the 35-h.p. Anzani-Blériot, Marcel Desoutter and J. L. Hall on the 50-h.p. Gnome-Blériot monoplanes.

Grand Speed Handicap (final 6 laps).

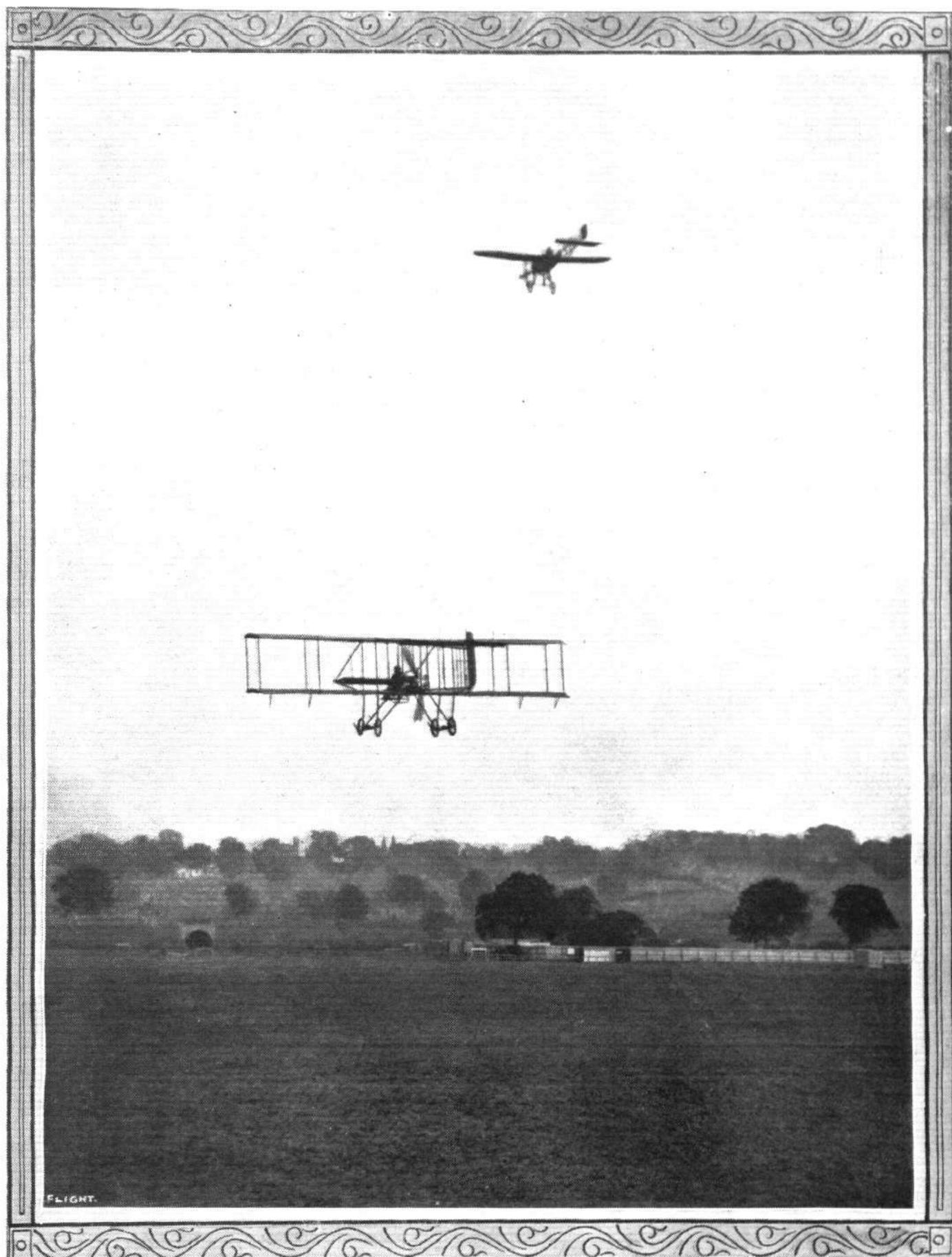
	Start.	Handicap	Net
	m. s.	m. s.	m. s.
1. Marcel Desoutter (50-h.p. Gnome-Blériot monoplane)	...	Scratch	13 8 9 38
2. Lewis W. F. Turner (50-h.p. Gnome-Grahame-White biplane)	3 30	13 14	13 14
3. R. T. Gates and passenger (70-h.p. Gnome-Henry Farman biplane)	1 34	13 25	11 29



AT BROOKLANDS AERODROME—A FEW PUPILS AT THE BRISTOL SCHOOL.—Reading from left: (top row) Mr. W. Bendall (instructor), Hon. Lieut. Boyle (passenger seat and who has just obtained his certificate), Capt. Pigot (in front seat, who has also just obtained his *brevet*), Mr. F. W. Merriam (chief instructor); (bottom row) Lieut. Empson, Major Forman, Lieut. Kitson, and Lieut. Rodwell.

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FLIGHT



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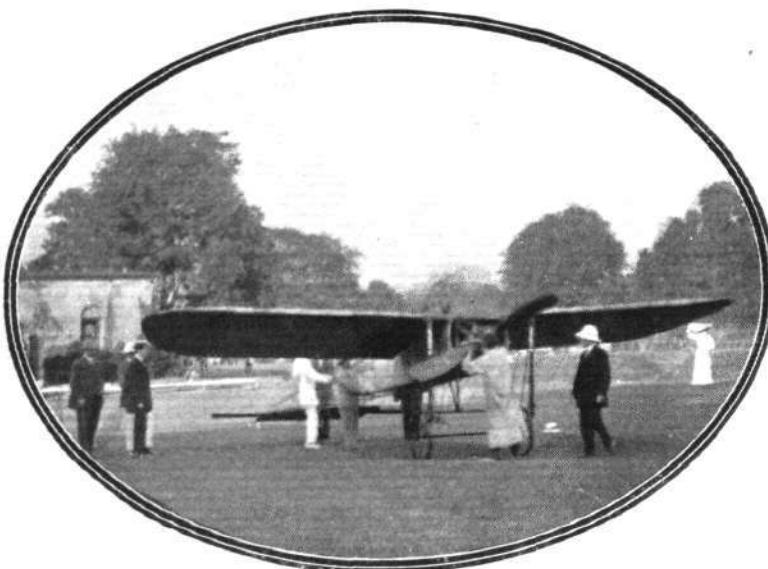
MONOPLANE VERSUS BIPLANE AT THE LONDON AERODROME, HENDON.—Mr. Lewis Turner on the Grahame-White 'bus and Mr. Hall on a Bleriot monoplane.

NOVEMBER 9, 1912.

AVIATION IN INDIA.

By ERNEST ESDAILE.

"MARKET" is undoubtedly the word that looms most emphatically in the vision of the manufacturer, and India is the best solution. Yet the happy marriage of product and market in this connection is not quite so simple as might appear at first blush. Having motored throughout a great part of this interesting jewel in the Imperial Crown for the purpose of preparing a report for presentation to the India Office, and having arranged the two chief aviation meetings out there, in Calcutta and



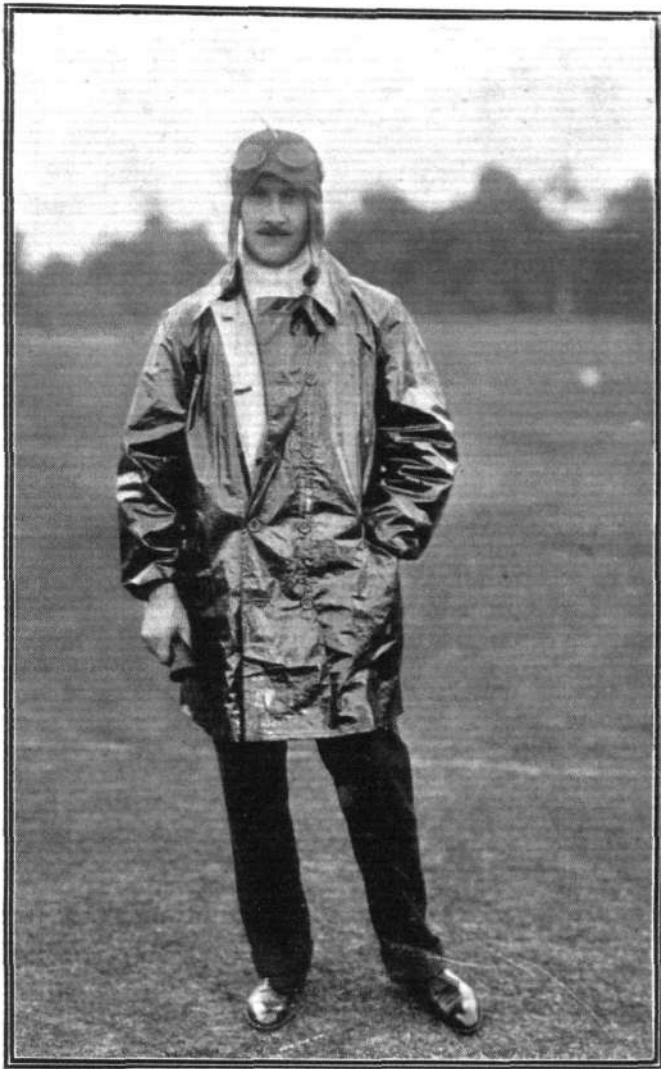
FLYING IN INDIA.—Jules Tyck starting for the first flight in India at the Tollygunj Golf Club.

Bangalore, I may, perhaps, be permitted without undue egotism to speak with some show of authority upon the matter.

It is not quite fair to say, as I have seen it stated, that "a certain amount of flying has been done in India under the most unfavourable conditions possible, and generally on the most absurdly inadequate machines," because the Farman biplane of Baron de Caters, and the Blériot monoplane with Gnome engine of Mons. Tyck were both excellent specimens of their kind,



A group of officials, &c., who were associated with the first public flight in India at Tollygunj on December 28th, 1910.—From left to right, bottom row: Mr. Jameson, Baron de Caters, Sir Moore O'Creagh (Commander-in-Chief of the Indian Army in 1910), and Mr. Ernest Esdaile. Top row: Mr. Sen, Capt. Barge, Mrs. Sen (sister of the late Maharaja of Cooch Behar, and the first woman to fly in India), Jules Tyck, Jean Tyck, and Lieut. W. Lawrence, who is now attached to the Royal Flying Corps.



Jules Tyck, the first aviator who ever flew in India.

and the height of 6,500 ft. which the latter attained at Calcutta, when he remained aloft for about three-quarters of an hour, would have been accounted a very fair performance anywhere. The biplane, too, was skilfully handled, and accomplished about 20 short flights, with a separate passenger on each occasion. The conditions at both Tollygunj and Bangalore Maidan were very favourable, and the authorities, both military and civil, did all in their power to aid the venture. Sir Moore O'Creagh, the Commander-in-Chief, took a very live and personal interest in the matter, as did also Lord Hardinge and his staff. If in the aftermath, repeated attempts were not a success, the results must be attributed to other causes than the difficulties of flying in India.

Truth to tell, the reception of aviation and of the aviators in Bombay was enough to damp the most ardent enthusiasts.

What visions of splendid receptions with eager bejewelled Rajahs waiting on the quay these intrepid Belgians had in their minds was rudely dispelled, and from officialdom, at any rate, it was soon evident no help would be forthcoming. I essayed to move "the Government," but alas! to be quite frank, we were snubbed. It was certainly

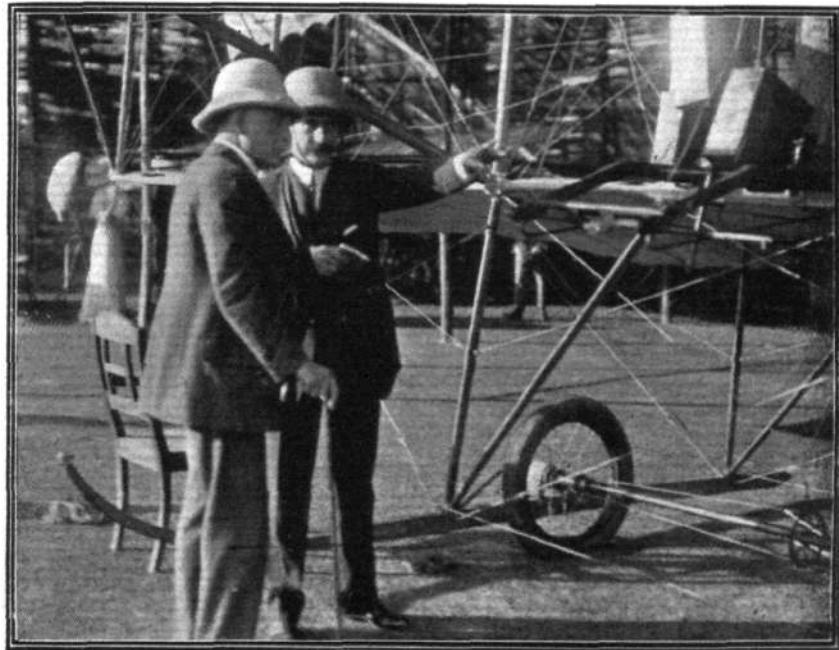
done politely, but, none the less, convincingly. Indeed, the whole matter was evidently regarded more from the showman's point of view than from any possible idea of aviation, as a new attempt at locomotion through whose far issues in the ever reaching forward demands of progress none might see the issue.

So I hastened to Calcutta with all speed feeling pretty certain that, as so often happens, what Bombay rejected Calcutta might be inclined to accept. Nor, as after events proved, was I mistaken. The famous Tollygunj Club soon fixed up matters and the meeting was arranged. I thought then, and have seen no occasion to alter my view since, that Bombay was much to blame for the general laxity that thereafter seemed to permeate India as regards flying. The enormous extra expense in transit that thus became necessary, the weary weeks of negotiation and hope deferred had an unmistakable effect on the whole business from which dreary effects it never seemed quite to recover.

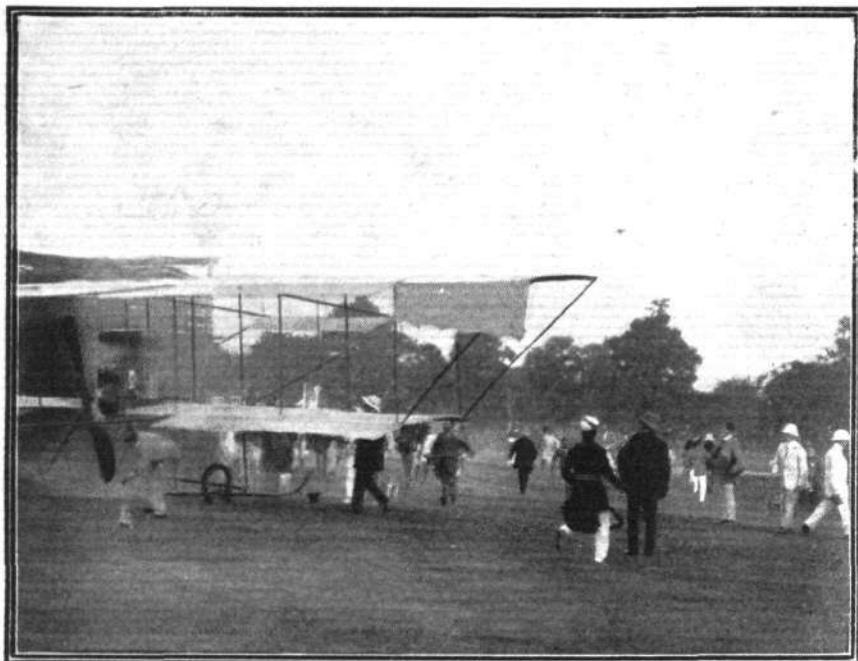
The Calcutta meeting was a success. Inside the grounds were some 10,000 natives and 5,000 Europeans, but outside were literally millions. The road for some three miles—the only road as it happened—was literally one huge block of cars, hackneys, tongas, carriages of every sort and description. The sahib in his 6-cylinder car, the Maharajah in his gaudy carriage, the humble pariah in his reckla, all were jostled into an indescribable hubbub. The police arrangements, such as they were, broke down completely, and whereas the total gate receipts actually amounted to Rs. 12,000, or about £800, there must have been ten times the amount which never reached the ground.

At Bangalore, where we next went, the arrangements were perfect—the military took them in hand, but the receipts were indifferent. Natives and Europeans soon got scent that once up in the air and the aeroplane could be seen just as easily *sans* payment. There are many Scotch in Bangalore. Still we took some £400, and a handsome gift of £200 from the most interested spectator present—the Maharajah of Mysore—helped agreeably to swell the coffers.

The long delays in negotiations had now practically



FLYING IN INDIA IN 1910.—Sir Moore O'Creagh, the Commander-in-Chief of the Indian Army, mastering details of the Farman under the guidance of Baron de Caters.



FLYING IN INDIA.—The Farman machine has a little mishap from a backfire igniting the petrol. Fortunately there was plenty of sand on the Tollygunj golf course with which to save the machine before much damage was done.

rendered further meetings impossible, and although one or two abortive attempts were made no real flights took place subsequently.

Still India needs aviation, and aviation needs India. Some such thought as this was the genesis of the scheme of a flight to India. It is rather interesting to note the divergence of opinion as to the possibility or the practicability of this idea. Thus the *Pall Mall Gazette* dismisses the whole scheme as "ridiculous," and adds "It is not worth detailed condemnation," whereas the *Academy* says "It is to be hoped that nothing will be allowed to stand in the way of the attempt. As a test of the capabilities of the modern aeroplane it will be supreme." And as I write these words I have before me a letter from an old diplomat and soldier who has spent many years of his adventurous life in the region across which this "impossible" flight is to take place, in which he says:—

"The more I think of the scheme the more I think of the extraordinary effect and sensation it will have on the Oriental mind in the way of enhancing British prestige in the districts traversed. The imaginations of the Arabs, Turks, and Persians cannot fail to

effective way of materialising the orders.

be deeply stirred by the idea, and the political effect should be very great. When you have the details of the scheme fixed I shall be very glad to place it before the Council of the Geographical Society so that Lord Curzon, the President, and the members can have an opportunity of giving it at least their moral support. I think that the scheme distinctly comes within the province of geographical science."

The Maharajah of Jodhpur, in offering a prize of Rs. 3,000, says, "It will no doubt be a history making flight." The Maharajahs of Patiala, Cooch Behar and Bikaner, and the Begum of Bhopal have also offered valuable prizes. Finally, Cody has expressed his readiness to be the pilot and go alone if no others are willing.

As I have said already, aviation has as much to gain from India as India from aviation, which, in my opinion, is a very great deal. The British manufacturer should not lose his chance of building a market there for his goods, and without doubt the proposed flight, which could certainly take place if a few responsible people volunteered their co-operation, would be quite the most



FLYING IN INDIA.—A curious effect from a double exposure of a negative whereby the two machines at Tollygunj were apparently flying at the same time. Note the excitement of the natives in following the evolutions of the machines.



Motor Sunday at Hendon.

IT is but to reiterate an axiom to say that the extraordinary rapid developments in aviation have only been possible through the great strides made in the design and construction of petrol engines in recent years, and, by way of recognising the co-operation extended by the automobile industry to the newer mode of travel, Mr. Claude Grahame-White and the directors of the London Aerodrome have invited the whole of the members of the Society of Motor Manufacturers and Traders to visit Hendon to-morrow, Sunday. An extra good programme of exhibition flights by well-known aviators has been arranged, and no doubt a large number

of motorists will take advantage of their presence in town or the Olympia Show to get a peep at some real good flying.

Guy Fawkes' Day at Hendon.

OWING to the bad weather which prevailed on Tuesday last, Guy Fawkes' Day, it was decided to postpone the programme of night flying and "war in the air" until this (Saturday) evening, when visitors to the London Aerodrome, Hendon, should, weather permitting, be served with a "bumper" entertainment. A mimic fortress has been built, and after being bombarded from the aeroplanes with fireballs it will end in a huge bonfire. The grounds will be illuminated, and the aeroplanes will carry searchlights, &c.

NOVEMBER 9, 1912.

FLIGHT



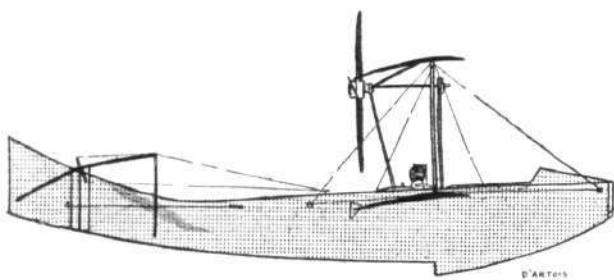
FOURTH EXPOSITION INTERNATIONALE DE LOCOMOTION AERIENNE.—General view of the central stands as seen from the gallery. In the distance may be seen the battery of motor aeroplane escorts exhibited by the French Minister of War. Above them, suspended from the roof, is one of the Nieuport 100-h.p. "Hydravions."

The Paris Aero Salon

IN last week's issue we were able to place before our readers a general review of this most important fixture of the aviation year, and commence upon a series of brief articles outlining the main characteristics of the aeroplanes exhibited there. This week we continue the series of descriptions, illustrating them by sketches obtained by our artist in Paris. Included in this week's issue is a table giving the principal dimensions and particulars of every machine exhibited at the Salon, and next week we hope to conclude the series of detailed articles.

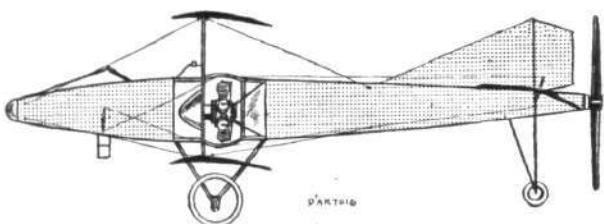
d'Artois.

THE name is a new one, and so are the machines, but the firm that is producing them was one of the earliest to enter the arena of aeroplane construction in France—the Tellier firm to wit. During



The d'Artois hydro-biplane.

1910 the Tellier monoplane came into considerable prominence in the hands of Emile Dubonnet, but since he discontinued flying the firm seems to have altogether dropped constructing, until now that they are re-opening operations with the assistance of MM. Louis Gaudart and Schreck. They are showing two machines, one a rather novel biplane and the other a hydro-biplane, which follows to a certain extent the lines of the Donnet-Lévéque. The first of



The d'Artois torpille biplane.

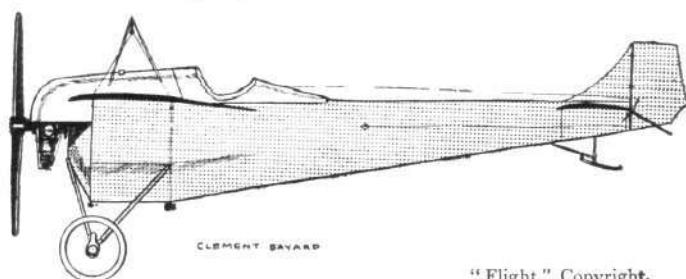
these machines is of the "torpille" type, that is, it is driven by a propeller arranged at the tail end of the machine. M. Louis Gaudart is responsible for its design, and he will be remembered as the pilot that carried out the initial tests of the Paulhan-Tatin aero-torpille, one of the most notable exhibits at last year's show. Differing from this machine, the d'Artois torpille biplane has a simple fuselage of rectangular section constructed for the best part of wood. Only in the neighbourhood of the engine, a 50-h.p. rotary Gnome, is steel used. Excepting in that part, too, the body is covered in with fabric. The landing gear is an extremely simple construction of steel tubing and is of a type that seems to be finding many adherents among French constructors. The main planes are built about a single tubular spar arranged at the approximate centre of pressure. They are united to the fuselage in so simple a manner that it needs but the removal of a bolt or two to dismantle them. Apart from the presence of the propeller, which is driven by a hollow steel shaft of 40 mm. external and 34 mm. internal diameter, the tail is of purely conventional design, consisting of a

flat stabilising surface with elevators hinged to its rear edge. As in the Tatin torpille, whipping of the shaft is prevented by a number of ball bearings arranged at equal distances between the motor and the propeller.

For the hydro-biplane, its central unit of construction is a *coque*, which serves the double function of *fuselage* and float. Near the front it is of rectangular section, but aft of the main planes the two top longitudinals merge into one, giving the after portion a triangular section. The pilot sits low down in the body in advance of the planes. Behind him is the motor, a 50-h.p. Gnome, driving, by chain transmission, a four-bladed propeller mounted high up between the planes. Like other hydro-aeroplanes, a starting-handle is fitted. The supporting surfaces are in every respect identical with those of their torpille biplane.

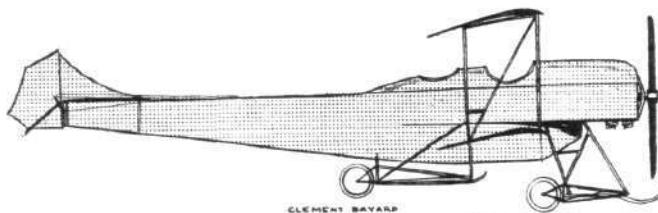
Clement-Bayard.

THEIR monoplane is one of the prettiest jobs in the whole Salon. Hardly the same can be said of the biplane they are exhibiting, for, although good throughout as concerns both design and workmanship, it seems considerably more complicated about the chassis than it need be. The monoplane is a single-seater fitted with 50-h.p. Gnome motor, and betrays traces of R.E.P. influence in its design. Its body, for instance, is almost identical with that of the machine we mention; also, at first sight, is the chassis, but on closer examination it will be seen that it works on a different principle. Its two running wheels are mounted on a common axle that is strapped down by rubber springs to a horizontal tubular member, which unites the basis of two "V's" extending downward from the *fuselage*. One of our sketches shows this point well, and in the same drawing may be seen how the fixed horizontal member



The 50-h.p. Clement-Bayard monoplane.

and the movable axle are connected as a precaution against an extensive smash occurring should the rubbers break. Altogether, it is the neatest and, we should think, the most efficient chassis this year's Salon has brought forth. On the machine shown the wings are constructed chiefly of wood, but have tubular spars of steel.



The 100-h.p. three-seater Clement-Bayard biplane.

We were informed, however, that wings with an all-metal skeleton had been made for the monoplane, and, in fact, they would be fitted to the machine before the Show closes. Its tail is a lifting organ, and singularly pretty in outline. It is kept clear of the ground by a neat skid built up of laminations of bent wood.

The large three-seated biplane has a *fuselage* which only differs from that of the monoplane as regards size. Its tail organs, too, are identical. The main points of difference lie in its landing gear, and

A Tabular Description of the Aeroplanes at the Fourth Paris Aero Salon.

Constructor.	Type.	Principal Dimensions.			Weight.		Construction.	Landing Gear.	Controlling.		Type of Body.	Motor.		Propeller.	Price.		
		No. of Seats.	Span.	Length.	Machine.	Useful Load.			Lateral.	Longitudinal.		h.p. and Type.	No. of Cyls.	Position.			
Astra	Hydro-biplane	335 44	580	60	—	—	Wood and steel	Floats	Wa.	Rear elevator	Triang. section	100 Renault	12	Front	Integrale	£ 1,800	
Bertin	Monoplane	229 34	226	75	770	—	"	Wheels	"	"	Pent. section	100 Bertin	8	"	"	—	
Besson	"	222 44	323	60	730	—	Steel	W. & S.	Ai.	Front elevator	Pent. and tri.	70 Gnome	7	Rear	"	1,400	
Blériot	"	125 29	162	62	530	286	Wood	Wheels	Wa.	Rear elevator	Rect. section	50 "	7	Front	"	860	
	Monocoque	227 32	215	71	660	550	"	W. & S.	"	"	Coque	70 "	7	"	Levasseur	1,072	
		2 — 40	270	75	830	—	Wood, steel and cork	W. & S.	"	"	Coque	80 "	7	"	Levasseur	—	
Borel	Monoplane	122 30	152	71	530	286	Wood	—	"	"	Rect. section	50 "	7	"	—	920	
	Monocoque	119 26	116	93	608	—	Wood and steel	"	"	"	Coque	80 "	7	"	—	1,040	
	Hydro-monoplane	227 37	237	62	880	—	Wood	—	Floats	"	Rect. section	80 "	7	"	—	1,120	
Breguet	Biplane	228 45	388	65	1160	—	Steel	Wh. (4)	"	"	Torpedo	80 "	7	"	Integrale	1,560	
	Hydro-monoplane	229 42	388	—	1760	—	"	—	Floats	"	Front elevator	Hydroplane	110 Canton-Unné	9	"	"	—
British Breguet..	Biplane	329 47 (44)	400	75	1320	—	"	—	Rear elevator	Torpedo	..	110	9	"	"	1,850	
Bristol	Monoplane	228 40	216	71	990	720	Wood and steel	W. & S.	"	"	Rect. section	80 Gnome	7	"	Bristol	1,400	
Caudron	"	120 28	118	64	490	—	Wood	—	Wheels	"	Torpedo	50 "	7	"	Gremont	880	
	Hydro-biplane	333 45 (31)	376	60	880	—	"	Fl. & Wh.	"	"	Pent. and tri.	50 "	7	"	Integrale	1,280	
Clement-Bayard	Monoplane	125 30	172	78	640	—	Steel	—	Wheels	"	—	70 "	7	"	—	960	
	Biplane	337 52	538	56	1430	—	"	W. and S.	"	"	Rect. and tri.	100 "	14	"	"	1,400	
d'Artois... ..	Biplane torpille	123 33 (20)	280	—	880	—	Wood and steel	Wheels	"	"	Coque	50 "	7	Rear	"	800	
	Hydro-biplane	124 33 (20)	280	—	770	—	"	—	Wheels	"	Coque	50 "	7	"	—	800	
Deperdussin	Monocoque	121 23	97	105	—	—	Wood	—	Wheels	"	—	140 "	14	Front	"	—	
Donnet-Leveque	Hydro-biplane	228 35	194	59	660	—	"	Coq. & Wh.	"	"	—	50 "	7	Rear	Levasseur	1,200	
Doutre	Biplane	344 54	700	55	1320	—	"	W. & S.	Ai.	Front and rear	—	75 Renault	8	"	Integrale	1,200	
Farman (H.)	Hydro-biplane	226 45	344	62	950	—	Wood and steel	Floats	"	Rear elevator	—	50 Gnome	7	"	—	1,280	
" (M.)	Biplane	239 51	645	59	1270	—	Wood	W. & S.	"	Front and rear	—	75 Renault	8	"	—	1,280	
Goupy	Hydro-biplane	226 43	485	75	930	660	"	—	Floats	"	Rear elevator	80 Gnome	7	Front	"	1,400	
Hanriot... ..	Monoplane	123 29	151	71	660	396	Wood and steel	W. & S.	Wa.	—	Rect.	—	7	"	—	1,000	
	"	226 43	226	78	935	616	"	—	Wheels	"	"	100 "	14	"	"	1,920	
	" (metallic)...	123 28	151	71	550	367	Steel	—	Wheels	"	"	50 Rossel Peugeot	7	"	"	1,000	
Morane	"	121 30	151	70	660	352	Wood and steel	Wheels	"	"	"	50 Gnome	7	"	"	—	
	"	224 37	194	70	890	618	"	—	"	"	"	80 "	7	"	"	—	
	"	224 36	226	70	1150	505	"	—	W. & S.	Ai.	Automatic	—	75 Renault	8	"	"	—
Moreau	"	231 39	258	63	1020	—	"	—	W. & S.	"	Rect.	—	70 Gnome	7	"	"	1,280
Nieuport	" (racer) ..	131 23	140	90	—	—	"	—	Wa.	Rear elevator	Rect.	50 "	7	"	Rogy	1,000	
	"	123 28	155	66	570	—	"	—	W. & S.	"	"	28 Nieuport	2	"	"	720	
R.E.P.	Hydro-monoplane	329 40	242	72	1230	—	Steel	Floats	"	"	"	100 Gnome	14	"	Integrale	1,200	
	"	225 39	215	68	1190	—	Steel	Float (1)	"	"	Pent. and tri.	80 "	7	"	"	—	
Sanchez Besa	Monoplane	226 36	237	75	—	—	"	W. & S.	"	"	90 R.E.P.	7	"	"	—	—	
Savary	Biplane	333 54	538	60	1320	—	Wood and steel	Wheels	Ai.	"	Rect.	70 Renault	8	Rear	"	920	
Sloan	"	3—64 (47)	—	53	1430	—	Wood	W & S.	"	"	—	75 "	8	Front	"	—	
Sommer	Monoplane	329 43 (29)	473	65	683	—	Wood	—	W. & S.	"	Rect.	120 Laviator	6	"	"	1,280	
Tubavion	Biplane	122 28	172	68	595	—	Wood and steel	Wheels	Wa.	Front and rear	—	70 Renault	8	Rear	Rapid	880	
Vinet	Monoplane	241 52 (34)	580	55	1100	—	Steel	W. & S.	Ai.	Rear elevator	—	70 Gnome	7	"	Integrale	1,280	
Zodiac	Biplane	2—33	215	65	727	—	Steel	—	Wa.	—	Rect.	50 "	7	Front	Normale	880	
	"	121 28	162	60	440	—	Wood	—	Wa.	—	"	50 "	7	"	Integrale	1,120	

W. & S. = wheels and skids.

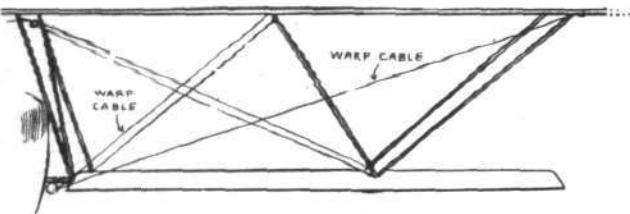
Fl. & Wh. = floats and wheels.

Wa. = warping.

Ai. = Ailerons

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in the fact that it has two spreads of wing instead of one. Its chassis is a rather more complicated version of that which was shown on their biplane last year. It consists of two horizontal wooden skids united to the fuselage by a structure of steel tubing. At the rear extremity of each skid is hinged a steel fork in the form of a

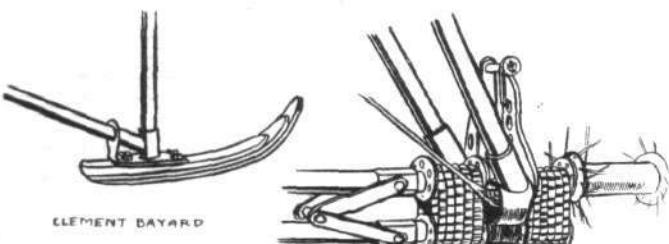


CLEMENT BAYARD

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How the planes of the Clement-Bayard biplane are braced.

triangle, which supports a pair of wheels. The shock absorbers are fitted horizontally between the front of the skid and the base of the fork, so that, should there be a shock on landing, the wheels may give in a vertical direction. Behind the two main skids, and attached to the base of the fuselage, is a third skid with wheels, which, in that position, does away with the necessity of fitting a tail skid. The planes of the biplanes are so designed as regards their attachment to the fuselage that they may be dismantled in a minimum of time. A triangular construction of steel tubing surrounds the body in the neighbourhood of its centre of gravity, and to this structure the planes are assembled. Their cross bracing is rather interesting, and this we illustrate by means of a sketch, for this



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Two details of the Clement-Bayard. On the left the rear skid; on the right the system of shock absorbers employed in the chassis.

system does away with a good deal of strutting and wiring, and materially reduces the head resistance of that part of the machine. Inside the body room is provided for two passengers sitting side-by-side in advance of the pilot.

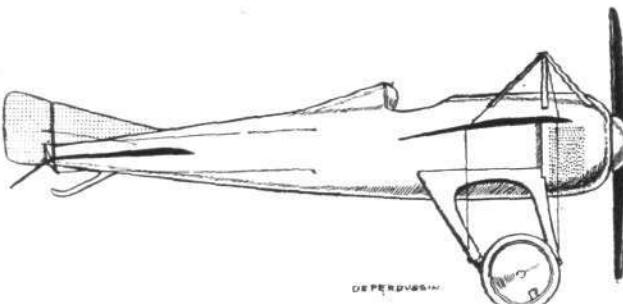
On the stand we had the good fortune to renew our acquaintance with M. Robert Grandseigne, who was a year or so ago connected with the English Bristol Company. He is now engaged in experiments for the Clement-Bayard firm, with a miniature hydro-monoplane, having more or less the characteristics of the little Santos Dumont-Demoiselle, which this firm used to construct in days gone by. It is to be quite an inexpensive and popular model, priced somewhere in the neighbourhood of £400, and fitted with the same type of horizontal opposed two-cylinder motor as those with which the Demoiselles were equipped. Already considerable success has been achieved by this model, and now it only remains to standardise the machine. We may expect its official appearance in about two months' time, when M. Grandseigne has promised us we may be able to give our readers a complete illustrated description of this interesting machine. Further, he informs us, the Clement-Bayard works have under construction an enormous biplane driven by an engine of 500-h.p. and capable of lifting a minimum load of twelve passengers. As the controls for a machine of this size would be necessarily difficult to operate by manual power alone, power relays, driven by compressed air, are being designed to perform this function at the will of the pilot.

It is interesting that whereas last year the greater part of the Clement-Bayard stand was occupied with a nacelle for a dirigible, this year there is nothing on the stand that would give one to imagine that the proprietors ever had anything to do with motor balloon construction.

Deperdussin.

PERHAPS no firm can be said to have made more progress than has the Deperdussin concern in France. Two years ago they had a

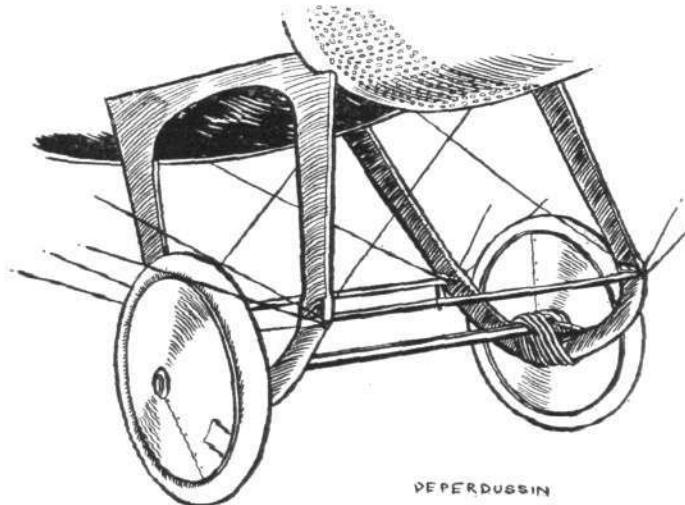
small stand in a more or less insignificant position in the gallery, where they showed quite a neat and promising monoplane, which had the peculiarity that it was driven by a six-bladed propeller. By last year they had grown to be one of the chief monoplane manufacturing concerns in France, and this year they come to the Salon with the Gordon-Bennett Cup to their credit. On their stand



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The Gordon-Bennett winner—the 140-h.p. D:p. monocoque.

they exhibit the machine with which Vedrines achieved this honour—a monocoque miniature in everything except the engine, which is a colossal rotary Gnome of 140-h.p. Naturally, as it is a speed machine—its flying speed is well over 100 m.p.h.—everything possible has been done to cut down head resistance to a minimum. Thus the body is of perfect streamline form, and of sufficient girth to totally enclose the pilot, leaving only the upper half of his head exposed. The wings are practically flat, and their average chord



DEPERDUSSEN

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The landing chassis of the Deperdussin monocoque.

measurement cannot be more than 4 ft., while they do not span more than 22 ft.

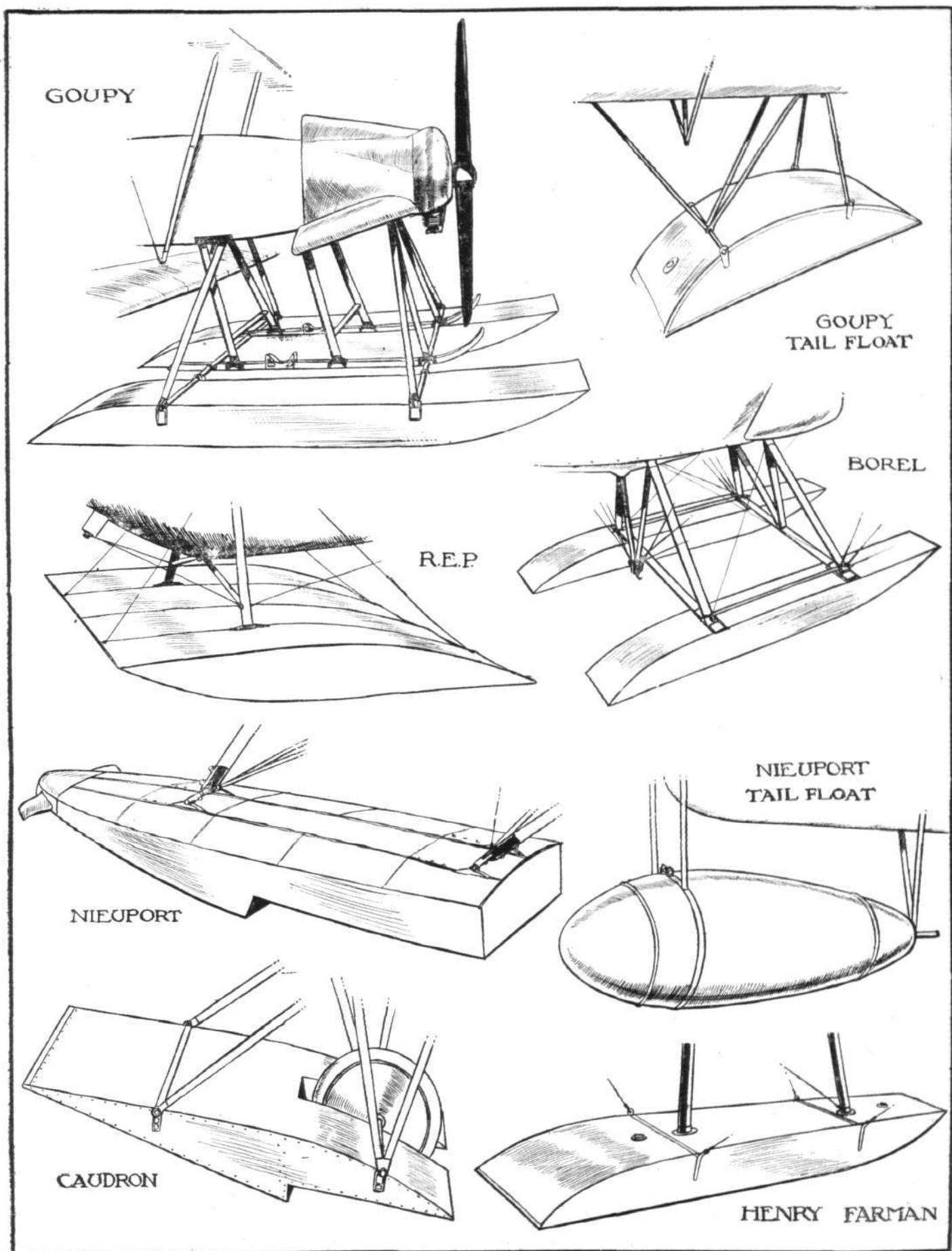
Over the front of the rotary motor is applied a semi-spherical dome through which the propeller of an unusually coarse pitch projects. This dome closely follows the bluff lines of the front of the fuselage, but there is sufficient clearance between it and the oil shield to admit air. Scarcely anything simpler than the racing version of the Deperdussin chassis can be imagined. It is constructed of multiple-ply wood bound with canvas. Disc wheels are used.

There is shown on the same stand a very similar model, a single-seater with an 80-h.p. motor. But this has no cowl over the front of the engine.

Goupy.

HERE is shown a hydro-biplane, built to seat three, and driven by an 80-h.p. Gnome engine. In no special point does it differ from the Goupy that was shown last year excepting, of course, in the landing gear which, in the present machine, consists of two pontoon-like floats, constructed by Tellier, supporting the body through steel compression struts.

As a side issue, M. Goupy is making a speciality of a new system of positive control termed the C.A.D. control. For it, it is claimed that, while it may be fitted with the simplicity of the Bowden system, it has the added advantage that it can transmit compression as well as tension.



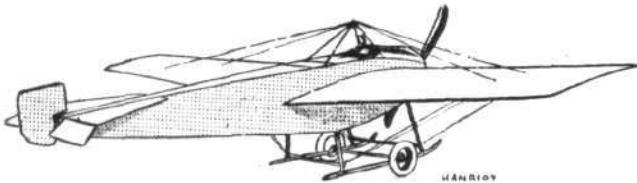
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Some of the types of float used on present-day hydro-aeroplanes, as seen at the Paris Aero Salon.

Hanriot.

THESE machines are in general outline a great deal like the Nieuport. The main difference lies in the chassis, which, in the Hanriot, is a particularly neat and robust wheel and skid construction. M. Pagny, who is responsible for its design, gave us a most thorough demonstration of all its fine points. To start with, the workmanship throughout is superb, and that is not only confined to show machines. The machines they turn out in the ordinary course of things are just as finely made.

First of all, the propeller. Most of those who have had anything to do with Gnome-engined monoplanes know what a delicate job it is to remove a propeller that has become stuck on its taper. Unless a special tool is used, a good deal of jarring has to be resorted to, and many good Gnome noses have not been improved by the treatment. Pagny sees this, and obviates it by running a thread at the wider end of the taper, and putting on a screw ring before the coupling is placed in position. Thus, if it is at all tiresome to remove, just a



The Hanriot monoplane.

turn or two of the screw ring will bring it off. Then, as previously mentioned, the motor may be taken out of the machine, *carlingues* and all, in almost no time. One of our sketches shows this detail well. Each side of the front *carlingue* is formed as a hinge, the core of which can be removed by knocking out the key that keeps it locked in its place.

The back-plate of the Gnome is treated in the same fashion. There is an interesting fitting, at the *cabane* on top. All the upper wing cables pass through this fitting, and the whole fitting, cables and all, can be taken clear by unscrewing a nut and lock nut. Thus there is no necessity to disconnect these cables when transporting the machine from place to place, for the wings may be fixed horizontally along the side of the *fuselage* in special fittings provided for that purpose. The tail is built up of steel tubing acetylene welded. That, too, is made to fold down alongside the *fuselage* by merely removing a bolt or two. Another of our sketches shows the cockpit and its assortment of cross-country instruments. It also shows the tool box conveniently arranged just behind the pilot's seat. A point of failing about the Hanriot monoplanes that figured in the British Military Trials was that observation was rather difficult. In the 100-h.p. Gnome two-seater shown the passenger's seat is much further forward, and allows of a view almost directly beneath the machine. Another Hanriot monoplane is shown on the Rossel-Peugeot stand. It is an all-metal product and wonderfully made.

As for weight, there is a considerable saving on this machine, for whereas a machine of a similar type in wood weighs, all on, 660 lbs., this model complete turns the scale at only 550 lbs. So that the wings may warp without permanently deforming the wing skeleton, each rib, which only weighs 8½ ozs., is jointed loosely at its four points, the leading edge, the front and rear spars, and the trailing edge. A 50-h.p. Rossel-Peugeot motor is instal'd in this machine, and, Pagny says, it is giving excellent results. We sometimes wonder why more of this engine has not been heard in the past. It is an excellent job throughout, easily one of the best specimens of rotary engine construction at present on the market, and, by the way, there are quite a number now. It has been in existence something like two years, and yet no one seems to have used it. But perhaps their time is coming now. This, however, scarcely concerns the Hanriot monoplane. All praise to them!

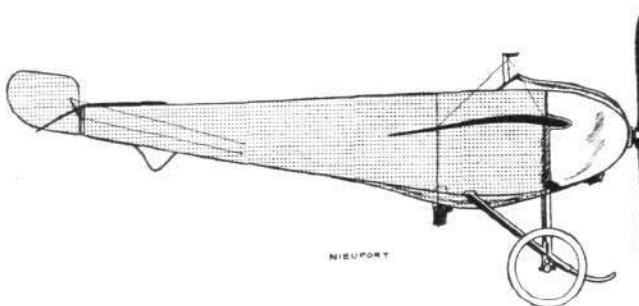
Nieuport.

FOUR machines are shown on this stand—a standard 28-h.p. Nieuport monoplane of the school type, a standard 70-h.p. two-seater, a new racing model, and a 100-h.p. "Hydravion," similar in every respect to the one that hangs suspended from the roof above the exhibit of the French Minister of War. No special description of the first two models is necessary. They are quite standard; and, for that matter, very little need be said of the latter two, for in the case of the racing model the machine is simply a smaller edition of the standard machine with changes in the chassis, and, for the Hydravion, it is but the ordinary 100-h.p. three-seater model with a float chassis instead of a wheeled one.

Let us first deal with the racing model. To attain high speed the designer has not resorted to high engine power. He has kept to the 50-h.p. Gnome, and to increase the speed has aimed at still

urther increasing the efficiency of the machine by cutting down head resistance.

This is chiefly noticeable in the landing gear, which, as a light construction having little head resistance, is perhaps good. But, as a landing gear, pure and simple, we doubt if anything more treacherous has ever been designed. As long as it is used only on



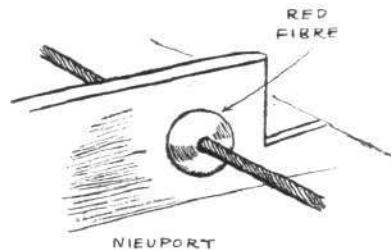
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The 50-h.p. Nieuport racer.

smooth ground, it may stand up to its work all right—that is, if it were in the hands of a skilful pilot. What would happen over rough ground we dread to imagine. The chassis is all of steel, and there are only two laminations in the transverse spring.

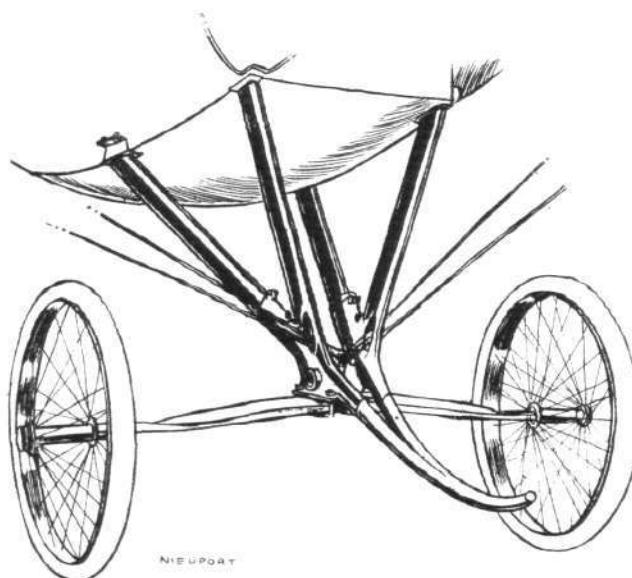
There being no horizontal skid it is impossible to arrange the warping as heretofore. On this machine it is operated by bell cranks just below the *fuselage*, worked by the feet as usual. To cut down some of the head resistance of the Gnome engine, a dome is fitted over the front, a quarter segment of it being cut away to admit sufficient air for cooling. The wings only span 23 ft. and they have noticeably less curvature and incidence than previous models. They are each stayed on the underside by four cables—two to each spar.

As regards the Hydravion, it has three floats. Two-stepped floats, supporting the body through a construction of steel tubing, form the main landing organs, and a miniature egg-shaped float



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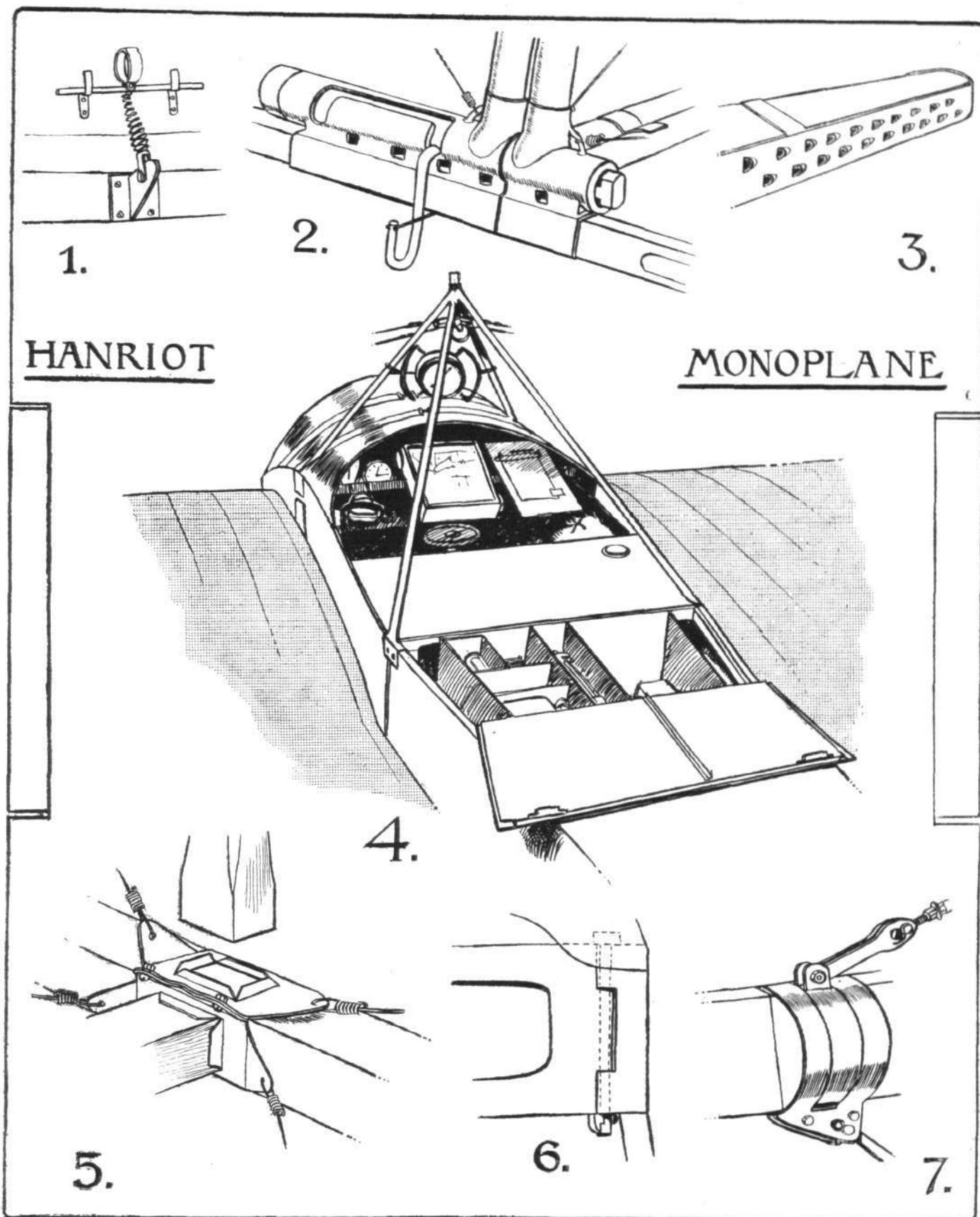
The neat control wire guide on the Nieuport monoplanes.



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The chassis of the 50-h.p. Nieuport racer.

supports the tail. For the construction of the main floats cypress wood is employed. A peculiarity about these are the small fin-like projections that extend laterally from the front ends of each float. They are so designed for a double purpose—to prevent the floats burying in a heavy sea, and to protect the propeller from

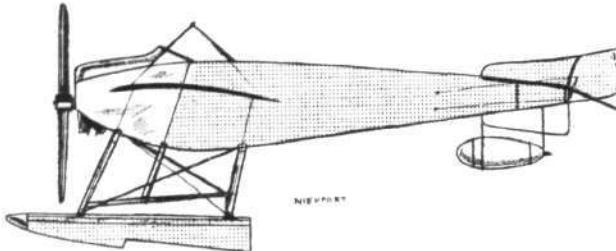


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DETAILS OF THE HANRIOT MONOPLANE.—1. The fitting by which the aluminium side-plates are clipped to the fuselage. 2. An interesting fitting by which the fuselage may be divided so that it can fold in two. To dismantle or re-erect the fuselage takes no longer than the time required to operate the bolt of a rifle. 3. Showing how the rear parts of the main skids are shod with steel and punched out to act as a brake. 4. The pilot's cockpit, showing his instruments, the fuel-tank, and his chest of spare parts and fuel. 5. The cross-bracing socket, stamped from sheet steel. 6. One of the four bolts which, being removed, allow the engine, together with its carlingues, to come clear of the machine. 7. The method of attaching the wing wires to the main spars.

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spray. The propeller, by the way, is further armoured at the tips. A change has been made in the building of the *fuselage* to strengthen it to withstand the heavier strains that landing in the water calls upon it to bear. In this machine, the vertical struts in the body are



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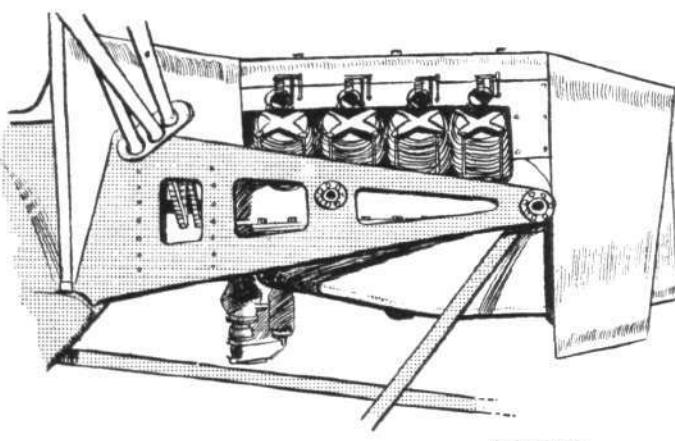
The 100-h.p. Nieuport hydro-monoplane.

of steel tubing, although the longitudinals and other portions of the body are still made of wood.

Two passengers can be accommodated in a wide seat immediately behind the pilot. He, the pilot, has before him, in addition to his controls and instruments, a starting-handle, by which he can put the motor in motion without exterior help.

Savary.

SINCE last year this firm do not seem to have changed their methods at all, and they remain almost the only firm of biplane manufacturers that have not been influenced by the monoplane trend in biplane design. Their present machine is fitted with a 75-h.p. Renault which is mounted in a rather neater manner than the engine on last year's machine. This point we illustrate. They are



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Showing the method of mounting the 75-h.p. Renault motor on the Savary biplane.

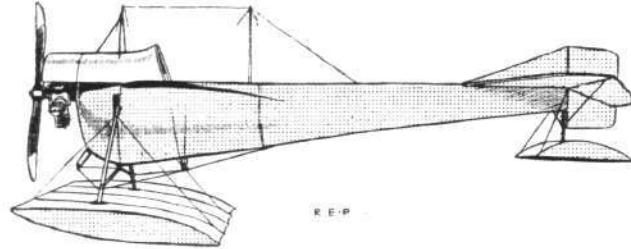
also showing, in a semi-finished state, a hydro-monoplane, the chief peculiarities of which are that it has a metal torpedo body and that the wings are stayed from the floats by an *haubanage* of steel tubing.

R.E.P.

AMONGST the hydro-monoplanes there is little doubt but that the R.E.P. two-seater is the favourite, partly because of its attractive appearance, but mainly because of the excellence that is shown in its construction and design throughout. When resting on the water its main weight is sustained by one large Fabre float 10 ft. wide, and measuring 8 ft. from front to back. A single float seems to harmonise with the general appearance of a monoplane a great deal better than a pair of pontoon-like floats such as most of the other constructors fit. In assembling this float to the *fuselage* the same system of flexible suspension is made use of that is employed on the standard land machine. It is the only hydro-aeroplane shown at the Salon in which provision is made for the absorption of any shock that may be caused by landing suddenly upon the water. In addition to this, the construction of the Fabre float materially assists in deadening the shock. This, in fact, is M. Henri Fabre's chief claim for his floats, that they are flexible and give to a certain extent under the hammering influence of the waves. The bottom of his floats are covered with three-ply wood 5 mm. in thickness. There are no transverse struts to support this, except one at the leading edge, for, were they fitted, it would

render the float too solid for M. Fabre's liking. The top of the float is covered in with strong fabric, tested to withstand a tension of 7,000 kilos. per square metre.

As for the remainder of the machine, it is purely standard in every respect, and remains one of the most notable examples of monoplane construction existing. It is interesting to mention that the machine



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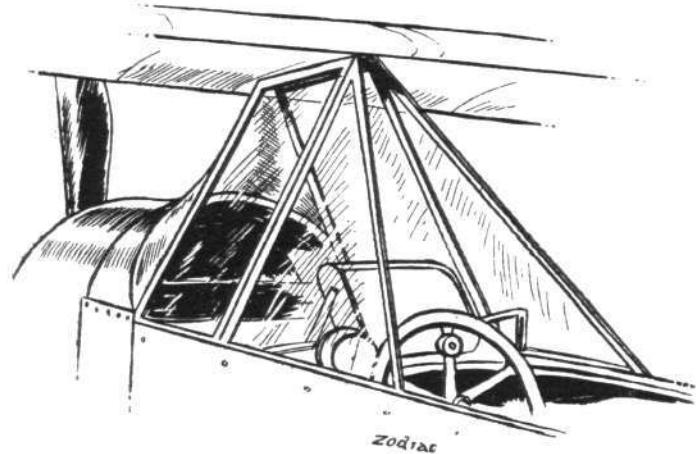
The 80-h.p. R.E.P. hydro-monoplane.

shown on this stand is the identical one with which Molla carried off the first speed prize at the Tamise hydro-aeroplane meeting in Belgium some time since. It is equipped with an 80-h.p. Gnome engine.

Zodiac.

THE Zodiac biplane has made no visible change at all since last year, except for the addition of a transparent shield above the pilot's and passengers' seats. Our sketches show this point, and also give a general idea of the machine.

It must be a wonderfully efficient biplane, for it must be no mean weight, and it does all sorts of passenger-carrying work with a 50-h.p. Gnome engine. The high aspect ratio of its planes must be



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The pilot's seat of the Zodiac biplane, covered in with non-inflammable celluloid to protect the occupant from the rush of wind.

responsible for this, as well as the saving in head resistance of a neat and clean chassis. One thing, by the way, we must mention; it is extremely welcome—after having had explained a dozen or so machines in rapid French—to come across one who speaks such excellent English as M. J. Labouchère, who flies the Zodiac, and who is looking after the firm's interest at the Salon.

(To be continued.)

**A Hydro-Aeroplane in Paris.**

ON the 1st inst., Chemet, on the Borel hydro-aeroplane, started from Argenteuil and alighted on the Seine, just by the Alexander III bridge, which is quite close to the Grand Palais, where the machine was moored for the night. This is the first time that a hydro-aeroplane has alighted in Paris. The next day he went off with a passenger, and came down at the St. Cloud Bridge, afterwards going on to Auteuil, then to the Sevres Bridge, coming down finally at Bezons.

Guillaux Over Paris Salon.

FURTHER opportunities of seeing an aeroplane flying over the Gay City were afforded Parisians on the 30th ult. and the 1st inst., when Guillaux on his Clement-Bayard monoplane repeated his exploit of flying from Issy and circling above the Grand Palais.



**The Royal Aero Club
of the United Kingdom**

OFFICIAL NOTICES TO MEMBERS

Aerial Derby Appeal.

THE Stewards of the Royal Aero Club met on Tuesday, November 5th, 1912, at 6 p.m., when there were present:—Sir Charles D. Rose, Bart., M.P. (in the chair); Sir Charles Henry, Bart., M.P.; and the Hon. Arthur Stanley, M.P.

DECISION.

The Stewards of the Royal Aero Club have had before them the appeal of Mr. T. O. M. Sopwith against the decision of the local Stewards, disqualifying him for the prize in the Aerial Derby Race on June 8th, 1912, on the grounds of his not having been seen by the official observer at the Purley turning-point.

After careful consideration of all the facts submitted to them, the Stewards are unanimously of opinion that Mr. Sopwith did pass outside of the Purley turning-point. The fact that he was not seen by the official observers, in accordance with regulation 6, was, in the opinion of the Stewards, due to the position which the observers were obliged to take up at that point, and not through non-compliance with regulation 6 on the part of Mr. Sopwith.

The Stewards unanimously agree to uphold the appeal of Mr. Sopwith against the decision of the local Stewards.

Lord Lonsdale, one of the Stewards, who was unable to be present, having had all the facts submitted to him, concurs with this decision.

International Aero Show at Olympia.

The International Aero Show held by the Society of Motor Manufacturers and Traders, under the auspices of the Royal Aero Club, will open on February 14th, 1913, and terminate on February 22nd.

Full particulars can be obtained on application to the Exhibition Manager, Society of Motor Manufacturers and Traders, Maxwell House, Arundel Street, Strand, London, W.C., or the Secretary, Royal Aero Club, 166, Piccadilly, London, W.

In connection with this Exhibition, a section for models will be organised by the Royal Aero Club, assisted by the Kite and Model

Aeroplane Association. The Royal Aero Club will offer prizes amounting to £50 in this section. Full particulars can be obtained from the Secretary of the Royal Aero Club.

Members of the Royal Aero Club will be admitted free on production of their membership cards.

Notice to Aviators.

The attention of aviators is called to the following regulations:—

The Royal Aero Club, being the sole authority under the provisions of the Fédération Aéronautique Internationale for regulating all matters relating to aeronautics and aviation in the British Empire, hereby issues the following notices and regulations to aviators of all nationalities within its jurisdiction.

1. Flying to the danger of the public is hereby prohibited. This shall be taken to include:

(a) Unnecessary flights over towns or thickly populated areas or over places where crowds are temporarily assembled.

(b) Flying over River Regattas, Race Meetings, Meetings for public games, and sports, except flights specifically arranged for in writing with the promoters of such Regattas, Meetings, &c.

2. Any disregard of the above notices and regulations will render the aviator liable to censure, suspension of certificate and removal from the Competitors' Register.

British Empire Michelin Competition, No. 1.

The Competition for this year closed on October 31st, 1912, and Mr. H. G. Hawker on a Sopwith biplane made a flight of 8 hrs. 23 mins. on October 24th last. This is the longest flight accomplished in the competition and the Committee of the Royal Aero Club will make the award on the 12th inst. Mr. J. T. C. Moore-Brabazon and the Secretary visited Brooklands on Tuesday last and went into all details relating to the aeroplane, which, in accordance with the rules, must be of British manufacture throughout.

166, Piccadilly.

HAROLD E. PERRIN, Secretary.

BRITISH NOTES**ROYAL FLYING CORPS.**

The following appointments were notified by the Admiralty on the 3rd inst.:—

Artificer Engineer.—F. W. Scarff to "Actæon," additional, for Aviation Course, November 1st.

Royal Naval Volunteer Reserve.—R. L. G. Marix and H. A. Littleton have been appointed Acting Sub-Lieutenants and appointed to "Actæon," additional, for Flying Course, November 1st.

Naval Aviation Centres for Ireland.

FOLLOWING out its scheme of placing aviation centres at various points round the coast of these islands, it is reported that the Government will shortly take in hand the organisation of seven stations round the Irish coast at Dublin Bay, Belfast Lough, Loch Foyle, Galway Bay, Berehaven, Queenstown Harbour, and Waterford Bay. It is stated that there will be at least a dozen machines at each centre.

And One at Liverpool.

ALTHOUGH the Government has so far only proceeded to the organisation of the aviation centres on the East Coast of England, it is not unlikely that the West Coast will shortly be receiving attention, and that one of the first stations will be at Liverpool. The aviators will work in conjunction with the masked battery among the sand dunes at Altcar and the batteries at Seaforth and Perch Rock.

An Aerial Maxim at Aldershot.

AMONG the practical work being carried out by the Royal Flying Corps at Aldershot is an extensive series of experiments with a Maxim gun fitted to a biplane of the B.E. type. Canvas targets representing aeroplanes have been placed on *terra firma* and tests made by firing at them from heights up to 3,000 ft.

OF THE WEEK.**Brooklands Flying.**

TO-DAY, Saturday (9th), there will be an Altitude Competition, in which the following will compete:—Mr. Raynham, Flanders mono.; Mr. Barnwell, Vickers mono.; Mr. Hawker, Sopwith biplane; Mr. Merriam, Bristol biplane; Mr. Bendall, Bristol biplane; Mr. Pashley, Sommer biplane; Mr. Spencer, Spencer biplane.

To-morrow (Sunday), a "get off the earth" or Quick Starting Competition has been arranged, and the following well-known aviators will compete:—Mr. Merriam, Bristol biplane; Mr. Hawker, Sopwith biplane; Mr. Barnwell, Vickers mono.; Mr. Bendall, Bristol biplane; Mr. Spencer, Spencer biplane; Mr. Pashley, Sommer biplane; Mr. Knight, Vickers mono.; Mr. Raynham, Flanders mono.

Mr. Hucks at Castle Bromwich.

By way of giving Birmingham folk a chance of seeing some up-to-date flying, the Midland Aero Club last week arranged a four days' exhibition at the Castle Bromwich playing fields, with Mr. B. C. Hucks and his 70-h.p. Gnome-Blériot monoplane as the attraction. On the first day, Wednesday week, no doubt owing to the unsettled weather, Mr. Hucks, in a 35 m.p.h. wind, made two good trips, one along the railway line to Saltley, and then rain put an end to the programme. Similar flights were made on the next afternoon, when during the first trip of 25 mins. duration he got up to 2,200 ft., and *vol planed* from 2,000 ft. up. On Friday he was up three times, the third time going up to 3,000 ft. and then coming down by a spiral *vol plane*. Some very spectacular flying was accomplished on Saturday, and at one time Mr. Hucks attained an altitude of 4,100 ft. At this height he experienced intense cold. Descending by one of his usual fine *vol planes* he was accorded an enthusiastic ovation. Arrangements have been made for further flights at Castle Bromwich to-day (Saturday).

There is Many a Slip, &c.

ALTHOUGH most people have practically forgotten the Aerial Derby Race round London on June 8th last, except in the way of a pleasant memory, there was an important sequel to it on Tuesday, when Sir Charles Rose, Bart., M.P. (Chairman), the Hon. Arthur Stanley, M.P., and Sir Charles Henry, Bart., M.P., sat, as Stewards of the Royal Aero Club, to finally adjudicate upon the appeal of Mr. T. O. M. Sopwith against his disqualification for first place. It will be remembered that he was disqualified on the ground that he was said to have passed inside the turning point at Purley, but witnesses have satisfied the Stewards that as a matter of fact he passed outside the mark and therefore the appeal has been upheld and the race awarded to Mr. Sopwith. Mr. Gustav Hamel, who was originally returned as the winner, now therefore takes second place.

Mr. Percival Flies the Dunne Biplane.

DURING last week-end Mr. N. S. Percival, the well-known Brooklands pilot, was at Salisbury Plain and made several flights on the Dunne biplane. On Friday he got in a couple of straights and on Saturday morning made two trials of a quarter of an hour each at heights ranging from 600 to 700 feet. Similar work was accomplished in the afternoon, and in one flight several miles were flown with the pilot's hands off the control. He also made one trip of six minutes at 200 feet with a passenger. Five minutes practice was put in on Sunday and on Monday one flight of five minutes was made with a lady passenger and a solo flight of a quarter of an hour at 500 ft. in a wind blowing from 18 to 20 miles an hour.

Mr. Hamel at Oswestry.

WITH the object of benefiting the county sanatorium scheme financially an exhibition of flying was arranged at Oswestry on Thursday of last week. Mr. Hamel was the pilot, and on his Blériot monoplane he made a couple of flights from a somewhat restricted ground in Brogyntyn Park, the seat of Lord Harlech, who was present. A fairly strong wind was blowing, but Mr. Hamel made two flights, one of ten minutes and the other of a little longer duration.

A Mishap at Wexford.

ON the 2nd inst. a demonstration of flying was given at Wexford Park, under the auspices of Messrs. M. G. Loder and Co., of the Dublin aviation school. While the Farman biplane was over the harbour the engine began to misfire, and the pilot was forced to make a sudden descent. He *vol plané* down to the water a few yards from the shore, and was rescued by boatmen who also towed the machine in.

**FROM THE BRITISH****FLYING GROUNDS.****Brooklands Aerodrome.**

OWING to the boisterous weather experienced over the greater part of the past week, there was comparatively little flying possible. On Thursday, Mr. Sabelli, of the Hanriot School, and Mr. Hedley, of the Sopwith School, left for Bulgaria, having accepted an offer made to them by the Bulgarian Government.

On Saturday, 2nd inst., a fair number of spectators were present. At 12.15 p.m., Mr. Sydney Pickles arrived from Hendon with a passenger, returning again at 2.45 p.m. Ten minutes after the arrival of Mr. Pickles, Mr. R. J. Hall arrived from Hendon on a Blériot machine, returning to Hendon at about 3 o'clock.

In the Bomb-Dropping and Alighting Competition there were five starters, the result being: 1st, Mr. Pashley, Sommer biplane; 2nd, Mr. Spencer, Spencer biplane.

On Sunday, 3rd inst. there was an excellent attendance of spectators. The weather conditions were ideal for flying, and all the available machines were up in the air at different times. Prior to the start of the Speed Handicap an exciting incident occurred, one of the Bristol pupils (Major Forman) having a fall, owing to his machine "side-slipping." He was luckily unhurt.

There was an excellent entry for the Speed Handicap, in which the competitors made a round of three circuits (about 4½ miles). The following is the result: 1st, Mr. Merriam, Bristol biplane; 2nd, Mr. Spencer, Spencer biplane.

Sunday morning, Barnwell first out on No. 5 for circuits, then handed over machine to Capt. Stott, who, having done some excellent straights, went up and did two good circuits and landed machine without a fault. Mr. J. de la Ferte then went up to 1,000 ft. and put in some excellent circuits ending with a very pretty *vol plané*. Knight then out for some very good circuits. In the afternoon Barnwell first out on No. 5 for one of his usual pretty flights which are becoming one of the features of flying here, then handed over machine to Mr. J. de la Ferte who also did some very good circuits.

Olympia Aero Show.

THE date of the Aero Exhibition, which is to be held at Olympia next year, has now been fixed. The Show will open on Friday, February 14th, and close on Saturday, February 22nd.

Michelin Cup No. 1.

ALTHOUGH the official award of the Michelin Cup No. 1, for the longest flight over an aerodrome on an all-British machine will not be made until the Royal Aero Club Committee meets next week, it is practically certain that it will this year fall to Mr. H. G. Hawker and the A.B.C.-engined Sopwith-Wright biplane. On the last day of the competition, the 31st ult., Col. S. F. Cody intended to make an attempt for the cup, but in landing after a trial flight his machine collided with a post, and a wing was buckled up.

Testing the Twin-Engine Principle.

ON the Short twin-engine biplane, Lieut. Seddon on Saturday rose from Eastchurch to a height of 6,400 ft. Then coming down to 900 ft. he cut off one engine, and made a flight of about 9 miles to the south of Sheppey and Leysdown, finishing up with a *vol plané* from 500 ft. It has been stated, as a result of this experiment, that should one motor fail at a height of 5,000 ft., the machine would be able to travel a hundred miles without alighting on the water.

"Emaillite" Used by the Austrian Army.

SOME reports have been in circulation claiming that various dopes are used exclusively by the Austrian Air Battalion, but an official statement which has been submitted to us from the Military Authorities at Neustadt goes to show that this is not correct. They are still using "Emaillite," and in fact have just ordered 25 kgs. of Emaillite No. 2 and 25 kgs. of Emaillite No. 3 for immediate delivery. It appears that there has been some dissatisfaction with the Emaillite made under licence in Austria as it does not seem to be up to standard, and the Austrian Government are not satisfied with any other than that manufactured in France by Leduc Heitz et Cie. It is claimed for Emaillite that it is perfectly water, oil and petrol proof and that it tightens, strengthens and preserves the fabric.

Mr. Ridley Prentice Joins G.A.C., Ltd.

WE understand that Mr. Ridley Prentice has now joined the General Aviation Contractors, Ltd., and is one of the directors of the firm. His unique experience, both as a pilot of machines of various types and also on the business side of aviation should prove a valuable acquisition to this enterprising and go-ahead concern, which, as our readers know, holds several important concessions, including those for Anzani motors, Emaillite dope, Rapid propellers, Dansette-Gillet engines, &c., &c.

**FLYING GROUNDS.**

Machine then handed over to Capt. Stott, who put up an excellent show, flying circuits with right and left hand turns and finishing with a beautifully timed *vol plané*. Knight then out on No. 3 for test flight, handed over machine to Mr. Soames who did some very good straight lines.

Bristol School.—Merriam trying conditions 9 a.m. Thursday, last week, after the rain had ceased but found too bad for School work. The two previous days of the week it was blowing and raining too hard for air work.

On Friday at 6.45 a.m. Merriam up testing new biplane which flew very well; in the meanwhile Bendall was up on another biplane and later again with Lieut. MacLean. Lieut. Boyle then made a good solo followed by Major Forman with Merriam to ascertain where to make his first circuit which he did afterwards very nicely. Merriam also looked after Lieut. Kitson who subsequently made a splendid flight, landing neatly. Bendall up also showing Lieut. Rodwell where to turn, the latter then made a good circuit flying well. Merriam up giving tuition to Lieut. MacLean twice and Bendall with same pupil for landing practice. Merriam finished the morning's work with a long spiral glide to Hangars. All pupils having three turns each to make up for the past few days lost through bad weather.

In evening at 3.45 p.m. Merriam trying air and found rather bumpy, half-an-hour later tried again and it being then much better he took up Lieut. MacLean. Bendall away on another machine for solo, afterwards taking up Lieut. MacLean. Lieut. Boyle made a nice solo and goes for his *brevet* in the morning. Major Forman doing left and right turns, also Lieuts. Kitson and Rodwell flying circuits each.

Merriam, after trying conditions, solo on Saturday 6.30 a.m. was followed by Bendall on another biplane, the latter afterwards taking up Lieut. MacLean, and then Merriam sat behind same pupil on straights. Lieuts. Kitson and Rodwell circuits each, the

latter unfortunately made a pancake landing from about 10 ft. smashing two stanchions and propeller. Major Forman making left and right turns, then Lieut. Boyle for a solo afterwards away for his "ticket," which he took in very excellent style, landing each test nearly on top of observers. Merriam then took up for a good flight Mr. Loyd, reaching a height of over 2,000 ft. and making a spiral descent, thus finishing the morning's work. In the afternoon Merriam first out with Lieut. MacLean as passenger, Bendall following on another machine and then up with Mr. Loyd. Major Forman and Lieut. Rodwell solo each. Merriam and Bendall flying in competition. Sunday afternoon Messrs. Merriam and Bendall making exhibitional flight, after which Lieut. Rodwell made two circuits, Major Forman following on right and left turns but had the misfortune to side-slip, smashing the machine rather badly, but fortunately without injury to himself. Merriam and Bendall up with Mr. Loyd and Lieut. MacLean. The two Bristol instructors then joined in the speed handicap, which was won by Mr. Merriam.

Vickers School.—Friday morning last week, Knight out for test flight on No. 3 then handed over machine to Capt. Stott, who did some excellent straight lines and curves. In the afternoon Barnwell first out on No. 5 for circuits about 1,000 ft. up then handed over machine to Mr. J. de la Ferte, who did a beautiful flight with right and left hand turns. Barnwell then on No. 3 for test flight, followed by Capt. Stott, who put in some good curves and was landing very well. Knight was also out later in the evening on No. 5 for good circuits. Next day in the morning, Knight on No. 3, followed by Capt. Stott, who showed still greater improvement and is ready for circuits now. Knight then on No. 5 followed by Mr. J. de la Ferte, who put in a beautiful flight. Barnwell then on No. 5 putting in one of his usual pretty flights. In the evening Barnwell first out on No. 5 and went up to 3,500 ft., finishing with a beautiful spiral *vol plané*. Mr. J. de la Ferte then out for excellent circuits with right and left hand turns. Barnwell then again on No. 5 and took machine up to 5,000 ft., going over Weybridge and the surrounding country. Mr. J. de la Ferte then out again for excellent circuits, followed by Knight, who did a pretty flight.



Photo by Mr. M. Pirkis.
Mr. de Havilland in the pilot's seat of B.E.2 at Farnborough.



A group at the Ewen School, Hendon, standing in front of the Caudron with 35-h.p. Anzani.—From right to left: Capt. Chamier, M. Baumann (the assistant instructor), Lieut. Eric Conran, Mr. Sydney Pickles (the instructor), Mr. H. H. James, and Mr. A. C. Hunter, the manager of the school. The three pupils qualified for brevets about a fortnight ago.

Very foggy early Monday morning but it cleared off later, and Barnwell was out on No. 3 for test flight, followed by Mr. Soames, who did some excellent straight lines and was landing very well. In the afternoon Barnwell out on No. 5 for long flight over surrounding country at 3,000 ft. up. Barnwell then out on No. 3 for test flight, followed by Mr. Soames, who did some excellent straights. Knight out on No. 5 for good flight over surrounding country about 500 ft. up, then handed over to Capt. Stott, who put in some excellent circuits about 300 ft. up.

Eastbourne Aerodrome.

TUESDAY, Wednesday, and Thursday last week were all too rough for outdoor work, but on Friday the weather showed a marked improvement, and Mr. Hammond was able to start instruction shortly after 3 p.m. Messrs. Lerwill, Roberts, and Thompson were the only biplane pupils on the ground, so they all had a good amount of instruction. Mr. Lerwill made several solos, flying very steadily all the time.

Saturday was again fine, although until about 2.30 p.m. there was rather too much wind for pupils, so Messrs. Fowler and Hammond seized the opportunity to go for a joy ride. Starting about 11.30 they flew over to the Willingdon Golf Club, where they had lunch. Fowler used his Blériot, and Hammond was on the Bristol with Mr. Wadham as passenger. The arrival of two aeroplanes at the golf club caused some excitement, and a large crowd collected to see the departure. On arriving back at the aerodrome, Mr. Hammond took up several passengers, treating them all to a *vol plané* from about 1,000 ft. Without wishing to flatter Mr. Hammond in any way, we must say his *vol planés* are a pleasure to watch; at times he seems to be almost stationary, and then just at the critical moment he will dive a little and save the situation. Mr. Cookson joined the school in the afternoon, and was given his first lesson. At 4 p.m. Mr. Lerwill went up for the first half of his test, which he completed after being in the air over 35 mins., a record length of time for five figure eights, or, rather, we should say six, as in doing his first eight he missed one of the posts. He flew fairly steadily, but took very wide turns round the posts and covered quite twice as much ground as was necessary. Sunday afternoon was again favourable. Mr. Fowler was out first, and was followed by Gassler, who put up an excellent flight on the 28 Anzani. Mr. Hammond then made a solo, after which Mr. Cookson had some further instruction, and finally Mr. Lerwill went up to do the second half of his tests. This he accomplished quite successfully, flying a great deal better than on the previous afternoon, and making very good time indeed.



Mr. H. M. Brock in the pilot's seat of the Deperdussin mono. at Hendon.

On Monday afternoon, Mr. Hammond took up Capt. Danvers for a flight, remaining up with him for about 20 mins. Thompson was then given some instruction in straight flights.

Farnborough (R.F.C.)

THE inclement weather of the early part of last week prevented any flying as regards the officers of the corps. Mr. de Havilland was out on BE 2 during fine intervals.

Friday brought a break in the weather, when Capt. Derbyshire and Lieut. James were flying on 206, the latest output of the Aircraft Factory, fitted with a 70-h.p. Renaults and a steel undercarriage with Oleo shock absorbers *à la Breguet*. Major Moss, Capt. Reynolds and Lieut. Herbert on 207 and 215, the Maurice Farmans fitted with 70-h.p. Renaults. The new 70-h.p. Renault-Breguet was flown by Serjt. Hunter, and then handed over to Lieuts. Shepherd and Playfair who did several straights. Mr. Raynham on Flanders passing her for the War Office tests.

Saturday, Capt. Derbyshire and Lieut. Longcroft on 206, the latter making a fine flight of 50 mins. round Borden with a passenger. Lieuts. Playfair and Shepherd on 213 doing circuits and handling machine quite well considering the limited opportunities they have had of learning. Serjt. Hunter flying 210 (Breguet 100-h.p. Gnome), which did such good work at manœuvres with Capt. Raleigh.

Monday, Mr. Cody up at 3,000 ft. with passenger, finishing up by making a tour of the country and golf-course, apparently about 3 ft. from the ground, with the exception of when he "dodged" some terror-struck individual. Major Burke and Mr. Longcroft on 206. Capt. Beck on 207 finding engine missing took over 215, then climbing to 4,000 ft. and finishing with a fine spiral *vol plané*, he afterwards taking Serjt. Mead for a trip. Serjt. Hunter handling 210 exceptionally well, taking her up to 2,000 ft. in 10 mins., and finishing with a fine *vol plané*. Lieuts. Playfair and Shepherd on 213 doing circuits, the latter banking well and showing great improvement.

Tuesday, Capt. Derbyshire, Lieuts. Longcroft and James on 206, Capt. Beck on 215 with Lieut. Brabazon as passenger, Serjt. Hunter making several good flights on 213. Lieuts. Playfair and Shepherd circuits on same machine. Mr. Cody out in afternoon, getting a severe "bumping."

Liverpool Aviation School, Waterloo (near Liverpool).

FRIDAY, last week, Melly on 2-seater doing figures of 8, going up three separate times. Birch followed on the "Y" type, flew round Hightown three miles away, and returned at a height of 1,500 ft., where he put in a figure of 8 and planed down with his engine shut off. Melly then went up in the "Y" type doing several figures of 8, banking well at the turns. Birch again went up in the same machine and after rising by figures of 8 to 1,000 ft. did a perfect spiral *vol plané* and did a complete turn with the engine shut off.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Weather conditions exceptionally bad early last week. On Friday, school work started at 6.50 a.m. with Mr. Lewis Turner giving circuit instruction on No. 5 Grahame-White biplane. Mr. Howard-Wright taking instruction on No. 7 Grahame-White biplane with Mr. Turner, and afterwards getting in some good rolling practice. Mr. Francis, after rolling for some time, did some good straights. Later in the day Instructor L. Noel took pupils on the No. 7; Mr. Howard-Wright and Lieut. Birch did some good straight flying, Mr. Francis rolling, Major Liles doing some fine circuits, and Major Madocks and Mr. Carr also having good practice at straights with instructor.

Saturday, under the instruction of Mr. Turner, at 7.50, Major Madocks had a flight on the No. 7, Major Madocks afterwards getting in some good rolling practice. Mr. Howard-Wright had a lesson in straights, Lieut. Birch rolling and hopping. Major Liles, Major Madocks and Mr. Francis doing straights. Later on, at 11 a.m., Mr. L. Turner took Lieut. Birch for a passenger flight. At 4.45, Mons. L. Noel made a cross-country flight.

School very busy Sunday. At 9.30 a.m. Mons. L. Noel gave instruction to Mr. Howard-Wright, Major Madocks, Lieut. Birch, Mr. Francis and Mr. Carr. All had several straights practice. Weather rather foggy. Machine used, Grahame-White No. 7, 50-h.p. In the afternoon Mons. L. Noel gave graceful exhibition flights and several passenger flights on the Grahame-White biplane "Wake up, England," 70-h.p. Mr. R. T. Gates also gave exhibition flight, lasting 25 mins., on the 50 h.p. Grahame-White biplane No. 5. He also took up several passengers on the 70-h.p. Farman biplane. Mr. L. Turner gave very good exhibition flights, making some fine curves, on Grahame-White biplane No. 5. Exhibition flights also given by M. Desoutter on 50-h.p. Blériot; Mr. S. Pickles on 45-h.p. Caudron, and Mr. Brock on a 60-h.p. Deperdussin.

Blackburn School.—On Friday, last week, Mr. H. Blackburn brought out brevet machine at 4.5 p.m., and made a test flight of 10 minutes, after which Messrs. Buss, Glew and Laurence Spink

had successive turns practising short, straight flights until the failing light prevented further school work.

Test flight by Mr. Blackburn Saturday morning, after which Messrs. Laurence Spink, Buss and Glew practised straight flights for an hour. All three are making very good progress.

Sunday morning, after a test flight by Mr. H. Blackburn, Messrs. Glew, Laurence Spink and Buss went on with their straight flight practice for an hour and a quarter.

Blériot School.—The first four days of last week were blank, owing to an almost continuous succession of high winds, rain and fog—separately, and occasionally all together. On Friday, however, the weather was quite fine, and Messrs. Gandillon and Gratien were occupied in doing straight flights at a good altitude on No. 3. In the afternoon, Mr. Seymour Metford took out a machine to test after tuning-up, and finding the Blériot was flying very well at about 300 ft., handed same over to M. Gratien, who did several circuits at about 70 ft., landing well each time. Mr. Sacchi did one straight flight before dark.

On Saturday, M. Gratien, continuing his practising for his *brevet*, was doing circuits and good figure eights at about 80 ft., and much improving in his landings and general handling of the machine. Mr. Reilly was doing straights on No. 3 at about 15 ft. in very good style, and shows much promise. Mr. Sacchi did two straights on L.B. 2, and, returning, misjudged the speed of the machine on the ground, and, in spite of Mr. Metford tackling the aeroplane in Rugby style round the *fuselage*, charged the enclosure railings, fortunately not doing much damage—the propeller also, by some miracle, escaping injury.

Deperdussin School.—Tuesday morning last week, extremely high winds and no possibility of school work. On Thursday, Whitehouse and Hooper practising short flights on Dep. No. 3, but weather not lasting enough to permit longer than half-hour practices. Next day, Mapplebeck on No. 3 doing good practice on straights. Hooper next took the machine up, but got off quickly, and attained considerable height, which allowed him no time to finish straight flight inside aerodrome. So, to prevent hitting the fence, he jumped the machine over it, but found trees in his way. In trying to turn he side-slipped apparently, and just grazing the fence top came to earth heavily, breaking one wing and demolishing effectively the landing chassis. In the evening Instructor Brock took out No. 4, doing a couple of circuits, finishing the day owing to the engine becoming seized.

Capt. Macdonald on Saturday doing good flights with Taxi No. 2, making splendid landings, but eventually got too near to pylon, and came down after slight collision, with strained wires and shifted wing, proving the stout construction of Dep. planes. Many others would have buckled up under such a strain, but nothing of this kind happened after hitting the pylon.

Instructor Brock took out two-seater Dep., Sunday, and did some very clever flying for half-an-hour or so. Later, with Mr. Spratt as passenger, he climbed to a height of about 1,200 ft., and made off outside the aerodrome in very wide circuits, maintaining his altitude for three-quarters of an hour, descending in splendid style, and landing with his usual cleverness.

Mr. Spratt, who has lately taken his *brevet* on the Dep., then took out the show machine, and at a height of 600-700 ft. put in a good 20 minutes' exhibition flying, but upon landing broke a chassis strut on rough ground.

W. H. Ewen School.—On Monday, last week, pupils were unable to get in any flying practice owing to unfavourable weather, Mr. N. E. Cowling, under the instruction of M. Baumann, was being initiated into the working of the controls.

Tuesday, Hangar again, chiefly in the erection of new Caudron. Wednesday and Thursday weather conditions still too bad for flying practice.

On Friday, from 7.30 a.m., a brilliant day's practice was put in by the pupils. Under the instruction of M. Baumann, Lieut. M. W. Noel and Messrs. M. Zubiaga, R. S. McGregor and E. T. Prosser were doing some excellent straights on No. 1 monoplane. Mr. Sydney Pickles had out the 60-h.p. Caudron, and after a fine exhibition display gave passenger flights to Messrs. M. Zubiaga and M. Baumann. In the afternoon he was again out with the 60-h.p. two-seater, and after a short solo flight gave a cross-country passenger flight, lasting 25 mins., to Mr. Sparrow, in the course of which he attained an altitude of 1,200 ft., and finished with a beautiful spiral *vol plané*; passenger flights were also given to Lieut. Moxley, Messrs. E. T. Prosser, and N. E. Cowling. M. Baumann again had Messrs. Zubiaga, Prosser, McGregor, and Lieut. Noel making good progress on No. 1 monoplane, while Lieut. McMullen and Mr. L. Russell were flying on No. 2 monoplane. Lieut. Moxley and Mr. N. E. Cowling commenced rolling, and made excellent attempts at straights.

Saturday turned out a fine flying day, and commencing at 7.15 a.m. the pupils put in an excellent morning's work. Mr. Pickles, after a short solo flight, gave passenger flights to several of

the pupils and others. M. Baumann was getting some splendid results with the pupils on monoplanes 1 and 2. Lieut. McMullen and Messrs. L. Russell and W. Warren were making nice straight flights and half circuits with good landings on monoplane No. 2. Lieut. M. W. Noel and Messrs. Zubiaga and N. E. Cowling rolling on No. 1 monoplane. After breakfast, the pupils were again out getting in some good practice. At noon, Mr. Pickles, accompanied by Lieut. M. W. Noel as passenger, started out for Brooklands on the 60-h.p. Caudron, arriving there at an altitude of 4,000 ft. at 12.20 p.m. After lunch there, Mr. Pickles gave an exhibition flight before returning with Lieut. Noel to Hendon. The return journey was made at an average altitude of 3,000 ft. Lieut. Noel kept a splendid log of the double trip.

The pupils were out at 9.30 a.m. on Sunday, when Mr. Pickles commenced work by making a solo flight on the 60-h.p. two-seater Caudron, after which several passenger flights were given to pupils and others. Under the instruction of M. Baumann, Lieut. McMullen and Messrs. L. Russell and M. Lawford were doing some nice straight flights and half circuits at 30 ft. on monoplane No. 2. In the afternoon M. Galy made an exhibition flight on the 45-h.p. two-seater Caudron biplane, while Mr. Pickles gave passenger flights, including a cross-country trip to Mr. Phillips, in which he reached an altitude of 2,000 ft., finishing with a beautiful spiral *vol plané*.

Jameson and Temple School.—Monday week, early, Mr. Temple was out on Blériot, making straights and handling the machine in a masterly way. Wednesday he was out doing good straights, following up with straights on Sunday morning.

Salisbury Plain.

Bristol School.—Monday, last week, was hopeless, a high wind preventing any attempts at flying, and work was busily carried on on the machines in the hangars. No improvement had taken place in the previous day's weather on Tuesday, and all the pupils were again confining their attention to assembling and tuning up the machines in the hangars. The weather was very gusty and strong on Wednesday. Pizey was out for trial, afterwards taking Lieut. McArthur to see if possible for pupil to take second part of his certificate. With a slight improvement in the conditions Lieut. McArthur went out and successfully passed the tests for the second part of his certificate, finishing his flights extremely well under the observance of Lieut. Lawrence. Capt. Williams went for a good solo flight, the wind rising very considerably whilst he was up, but he landed well and no other outdoor work was attempted. Weather was still bad in the evening and flying was not commenced.

On Thursday, England was out for the only flight, but weather was much too unfavourable for any sustained flying and no other attempts were made. After the usual trial of the conditions on Friday, Capt. Williams and Mr. Gray satisfactorily passed their *brevet* tests, observed by Lieut. Ashton and Mr. N. S. Percival. Sippe made a really fine flight on one of the school tandem monoplanes, this being his first trip in a Bristol. Busteed, ascending in one of the monoplanes for a test, then made a height trial of Prince Cantacuzene's machine. England was then out for two solos in one of the tandem machines, and Pixton made several flights in the Prince's monoplane. Busteed was first out in the afternoon, his second trip being in a new monoplane just recently received. Harrison was out with a prospective pupil for a trip, Pixton ascending in one of the lastest type monoplanes, and England flying solo in one of the school tandems.

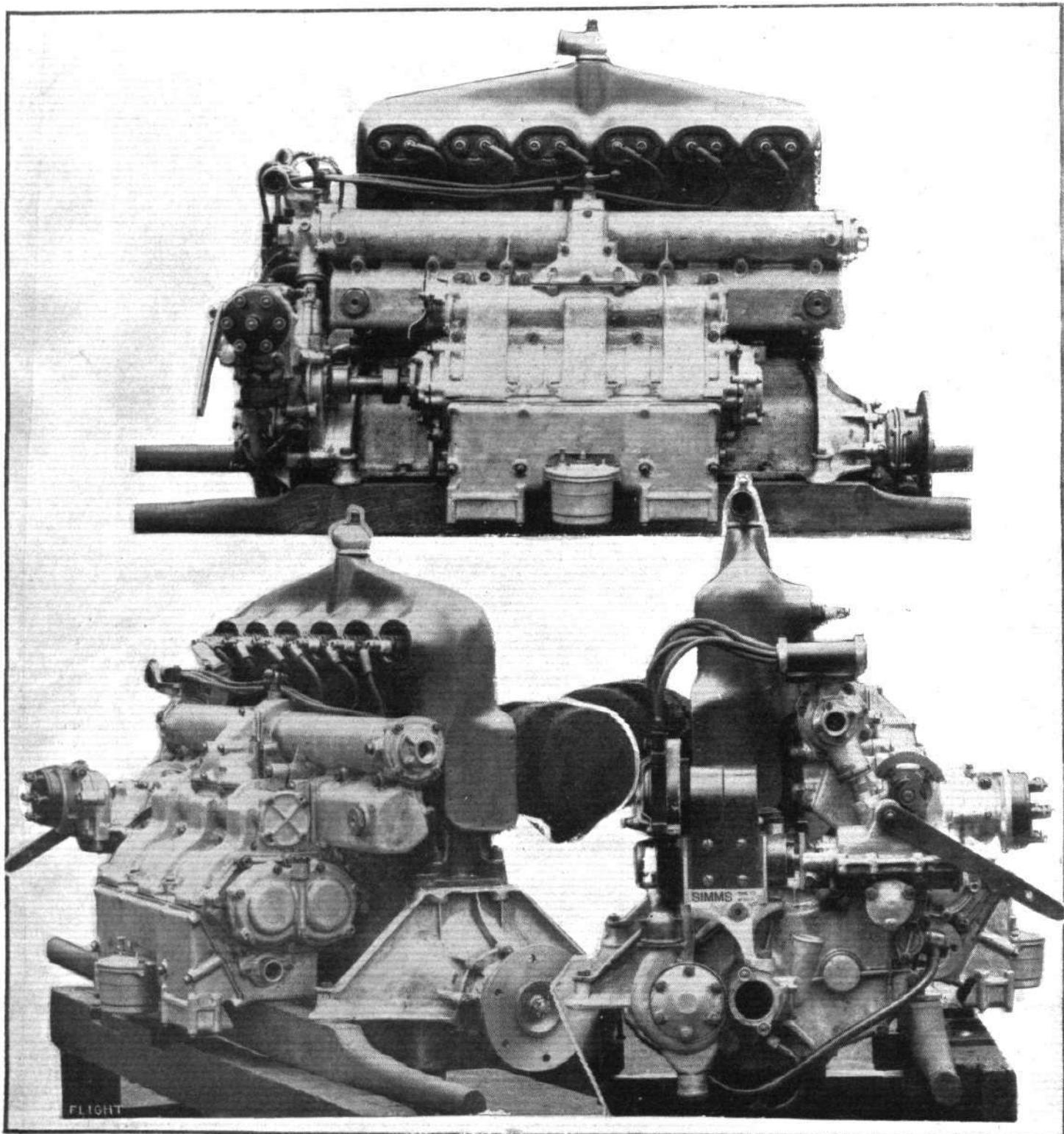
No flying on Saturday morning, the weather being too bad. Harrison out for tests later in the day in one of the tandems, and Prince Cantacuzene then set out for a cross-country flight in another of the school tandems, making a flight of over an hour's duration, his altitude at times being 3,000 ft. and landing with a splendid *vol plané*. England was out in the meantime for a trip in a monoplane, Busteed testing another type of machine, taking England as passenger in the second trip. Darkness prevented further work.

Royal Flying Corps.—Tuesday of last week did not open very well from a flying point of view, but Lieut. Fox, on biplane 203, was up for half an hour in a 45-mile wind. Rain and wind prevented flying on Wednesday, but on Thursday evening Lieut. Fox, during a 34-min. trip, was up to 4,000 ft. Friday morning, Major Brooke-Popham, on biplane 205, was flying for 15 mins., reaching an altitude of 2,000 ft., after which Capt. Allen and Lieut. Wadham were practising on the machine. Lieut. Smith-Barry flew over from C.F.S. at Upavon on the Avro biplane 404, and went back after only a short stay. Lieut. Fox was flying 203 for over half an hour, and in the evening he made another trip of 20 mins. Capt. Allen and Lieut. Wadham made several trials on 205, Lieut. Anderson being taken up as a passenger in one of them. Similar flights were made on Saturday morning by these officers, and no further flying was done until Monday morning, when three flights were made, Lieut. Fox being on 203, and Lieut. Wadham and Capt. Allen taking 205 in turns.

THE N.E.C. AERO ENGINE.

UNLESS we misinterpret the signs of the times, the day of the British-built aero engine is not far off. Some of the pioneers have had a hard time in all conscience, and they will be deserving of all that success may give them when it comes. Among those who should be the recipients of a full measure of good fortune, none deserve it more than the New Engine (Motor) Co., for this firm has tackled a problem of exceeding difficulty and has worked with

dogged determination to overcome every obstacle from the beginning of the modern development of flight. How hard they have worked, and to what good purpose, only a few know, and it is to be hoped that their new motor, which is about to come upon the market and of which we are able to give a few preliminary photographs, will speedily bring the merits of their construction in a more practical manner before the attention of all who fly.



THE 100-H.P. 6-CYL. N.E.C. TWO-STROKE AERO ENGINE.—These three views show very clearly the general appearance of this most interesting new motor, of which much is expected in view of the excellent record that has been maintained by the 50-h.p. model used by Mr. Ogilvie on his Wright biplane at Eastchurch. Nowadays, aeroplane builders are demanding engines more nearly in the order of 100-h.p. than 50-h.p., and the New Engine (Motor) Co. have thus placed their well-tried design on the market at an opportune moment.

It has long been recognised that the requirements of the modern aeroplane demand an engine in the order of 100-h.p. properly to fulfil the designer's chief ambition. A motor capable of maintaining perhaps, 70 or 75-h.p. would doubtless do all that is required for the time being, but the outcry among builders of aeroplanes has certainly been for the good British engine of 100-h.p., and it is a motor of this power that the New Engine Co. are in point of placing on the market. Long ago, this motor might have made its appearance, but Mr. Mort has been so anxious that it should be as perfect as possible in every particular that he has been reluctant to tear it away from the test bench, where it has been working, by all accounts, so well. It is not an engine, let us bear in mind, that has nothing more than a test bench to recommend it, for although the N.E.C. motors have not yet attained to the universal use that one day may be theirs, nevertheless, those of discerning mind will have watched with more than a measure of ordinary interest the performances of the 50-h.p. model that Mr. Alec Ogilvie has been using with such conspicuous satisfaction on his Wright biplane at Eastchurch.

Mr. Ogilvie was the first seriously to investigate as an unprejudiced pilot, the merits of the N.E.C. design, and what he found out in the earlier days when he was flying over the Camber Sands at Rye, caused him to decide that it was well worth while continuing his support of the firm. Many little things needed modification, naturally, for one does not develop a two-stroke engine as a reliable aero motor in a day or a month or a year. There are problems peculiar to the principle, and there are problems peculiar to the N.E.C. design, but in the end one and all appear to have been satisfactorily solved, and so the problems as such need no longer worry the mind of the prospective user. In its present form, the engine used by Mr. Ogilvie is conspicuous for its reliability; it starts easily, it works regularly and it develops its power all the time. One could not ask for more of any engine, and, in any case, the point of reliability is the one thing essential to all.

It is mainly in order that the new 100-h.p. model should pass into the hands of its users with the same degree of practical perfection as that to which the 50-h.p. model has attained in Mr. Ogilvie's service that its actual appearance on the market has been delayed, but, from what we learnt of its performances, we should imagine it to be more than ready for its work, and that the aeroplane constructor who is anxious himself to avoid delay in delivery might well put his name down now so as to be on an early order.

It is certainly an uncommonly interesting engine, this new 100-h.p. N.E.C., and as the company are first-class engineers, its good workmanship and strength may be taken for granted. It has six cylinders, and as the impulses occur with double the frequency in each cylinder as compared with the four-stroke cycle ordinarily in use, the evenness of turning moment ought to be exceptionally good.

Our photographs are sufficient to show that it is a motor of uncommon appearance, and our readers are well aware that it is an engine of distinctly uncommon design. Among the various solutions to the two-stroke problem it is, we believe, unique.

For the benefit of those who are quite unfamiliar with the two-stroke principle, we may explain that its primary object is to obtain an increase of power with the same weight of material by causing the piston to receive an impulse from an explosion once every revolution of the crankshaft instead of once every two revolutions as it does in the Otto or four-stroke cycle on which ordinary aviation engines, in common with motor car engines, are based.

Incidental to the evolution of the two-stroke idea in a practical form, is the abolition of the ordinary kind of valves with which the four-stroke cycle engine is fitted. The piston itself performs its own valve motion by uncovering an orifice in the lower portion of the cylinder wall, as it descends. There are, in fact, two such orifices, one communicating with the exhaust-box or silencer, which will be observed as a large cylindrical chamber attached to the outside of the engine, in our photograph, while the other communicates through the induction-pipe with the carburettor, which, on the N.E.C. engine will be observed low down on the opposite side to the exhaust.



Some Items of the Balkan War.

SERVIA has now obtained the services of four French pilots in Emile Vedrines, brother of the "national Jules," Raoul de Reales, Godefroy and Bourdin, and these left Paris for the seat of the war last Sunday night with their Deperdussin and Farman machines. Four Russian aviators have volunteered for service with Montenegro, while others are serving with the Bulgarian forces. One of these latter, Lieut. Popoff, is said to have been brought down by Turkish

shrapnel while flying over Adrianople on October 30th, and owing to the similarity of names a good many people have confused him with the aviator Popoff who used to pilot a Wright biplane but died from the results of an accident some year or so ago. An incident of the retreat from Kirk Kilisse was the destruction by the Turks of a couple of aeroplanes to prevent them falling into the hands of the Bulgarians. The Bulgarians have ordered a couple of German Albatross machines and it is said that Buchner has been engaged to fly them.

While the piston is at the bottom of the stroke, which is a minute interval of time, even when the engine is only running at a few hundred revolutions a minute, the exploded gases have to pass out of the cylinder down the exhaust and a fresh charge of unburned mixture has to enter. It is clear that complications may easily ensue from the admission of a combustion charge on the very heels of gas that may be still burning, and it is also evident that even when the charge does not pre-ignite some of it may either pass out with the exhaust when the engine is running very slowly or else never find time to get inside the cylinder when the engine is running very fast.

Thus roughly expressed, are the three main points that stand out as the basic difficulties interfering with the ready realisation of the two-stroke principle in practice. They constitute the first of the problems, that Mr. Mort, of the N.E.C. company, set himself so seriously to solve several years ago. He realised that the whole aim of the designer of an aero engine must always be to give the maximum power for the minimum weight and yet not sacrifice reliability. It seemed to him that the two-stroke principle, fraught with difficulties as it was, is, nevertheless, the proper line along which to seek a solution. Reliability, as he foresaw, would be of more importance than extreme lightness by the time that his engine was developed, and, by starting with the fundamental sizes and materials that have proved reliable in automobile practice and trying to increase their utility in power development by doubling the number of explosions in a given time, he knew that he was starting on a sound footing. Other engines built on the four-stroke principle might be cut down in weight, but so might he, too, be able to cut down the weight of his engine if it should ultimately prove safe to do so; in the meantime, his object was to make what weight there was more useful.

And so, reverting to the initial difficulties that attend the successful design of a two-stroke engine, Mr. Mort set to work to devise practical means for regulating the supply of mixture to the cylinders in such a way that they should be sure to obtain a proper charge in proper proportions of petrol and air, and that it should be placed in the cylinders without fear of pre-ignition from the burning gases. The solution to this problem is contained in the very simple rotary mechanism occupying the aluminium chambers between the carburettor and the cylinders in our photographs of the N.E.C. motor.

It will be understood, as matter that is self-evident, that the explosive mixture must be forced into the cylinders of an engine that is working on the two-stroke principle. In an engine that is working on the four-stroke principle, the piston during one of its idle strokes acts as a suction pump for the performance of this duty. That particular idle stroke, having, in the two-stroke principle, been converted into a working stroke, is no longer available for suction purposes, and means have, therefore, to be found for substituting an equivalent effect.

On the N.E.C. engine, a modified type of Roots blower is employed to this end. The Roots blower, in principle, may be regarded as a pair of meshing gear-wheels, the teeth of which form a perpetually closed door where they touch in the centre, and an endless succession of moving paddles as they move in proximity to the walls of their casing. The device is used frequently on motor car engines in the form of pumps for the circulation of water and oil. The blower on the N.E.C. engine is divided into two main parts, one dealing exclusively with pure air and the other with carbured air, that is to say a mixture of air and petrol vapour, of a richness above the normal. The object of that part of the pump which deals with the pure air is to blow a blast into the cylinders directly the descending piston uncovers the inlet port and thus scavenge the cylinder of burnt gases and leave it full of pure air. Immediately following thereon, the second part of the blower delivers its over-rich charge of fresh mixture, which diffuses through the fresh air and is finally compressed into a homogeneous explosive charge as the piston returns on its upward stroke. For the purpose of timing the entry of the gas, a rotary valve is interposed between the blower and the cylinders. These valves are simple cylindrical shafts running on ball bearings and are not in the least comparable with valves of the poppet type.



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FOREIGN AVIATION NEWS.

Daucourt Wins the Pommery Cup.

The Fourth Half-Yearly Competition for the Pommery Cup, which has been by far the most exciting of the series, ended without Daucourt's performance on October 6th, in flying from Valenciennes to Biarritz, a distance of 850 kilogs, on his Borel monoplane being beaten and so he won the fourth prize of £300 and a replica of the Cup.

Biarritz to Buc with One Stop.

In a final attempt for the Pommery Cup, Bernard, accompanied by his friend Senouque, started from Biarritz on the 31st ult., and flying on his Maurice Farman biplane by way of Libourne, Angouleme, and Civray, he reached Poitiers, and, after making a stop of only ten minutes, then went on by Chateaudun and Rambouillet to Buc, having covered 700 kilometres in 7½ hours. His machine was fitted with an 80-h.p. 7-cyl. Salmson-Canton-Unné motor driving an Integral propeller. On the previous day, at Biarritz, Bernard attempted to beat the passenger height record, but only got up to 2,550 metres.

Garros After Height Record Again.

With the intention of trying to beat the height record, Garros has been practising at the Lanciers Aerodrome, near Marseilles. While making a test flight on the 30th ult., his machine suddenly dived resulting in both the propeller and elevator being damaged.

Cross Country on a R.E.P.

LIEUT. CAMPAGNE, on a R.E.P. Military type machine, on the 31st ult. started from Buc and flew to Cercottes. He returned later in the day making a detour to Orleans over which he passed at an altitude of 1,200 metres.

British Officers at Farman Schools.

BOTH Lieut. Unwin and Capt. Mellor, who have been undergoing instructions at the Farman School at Etampes, have been making splendid progress, and put up several good flights during the past few days.

The Avlette Competition.

THE entry list for the competition for the Peugeot prize for a 10-metres flight on a machine propelled by muscular power alone has now closed with a total of 249. A good many of the machines are on exhibition at the Grand Palais, and the competition will be held this month, probably soon after the closing of the Exhibition.

Orleans Offers a Prize for Hydro-Aeroplanes.

THE first hydro-aeroplane arrived at Orleans on a Sunday and on lighting on the river Loire will receive a prize of 1,000 francs offered by the Aero Club du Centre. A large hangar in close proximity to the river will be placed at the disposal of competitors for the prize.

Blériot Pau School Re-Opened.

WORK is once again in full swing at the Blériot aerodrome at Pont Long, Pau, which has been re-opened for the winter season. As last year, MM. A. Leblanc and Sallenave will be in charge.

Long Journey on a Blériot.

ON one of the new tandem two-seater Blériots, Lieut. Sylvestre, with his mechanician left Etampes on Saturday morning with the

intention of making a non-stop flight to Belfort, a distance of 400 kiloms. The bad weather, however, necessitated two stops, one at Troyes and the other at Chaumont, but the aviators arrived safely at Belfort at 4.40 p.m.

Touring on Maurice Farman.

AFTER a tour of 400 kiloms., Barbaroux accompanied by his wife and Maurice Farman also with a lady passenger, both on Maurice Farman biplanes, returned to Buc on Monday evening. On their way they made a stop at Etampes, where Maurice Farman tested some of the school machines to see they were in good order.

Regy Family in the Air.

AT the Nieuport School at Villacoub'ay on Monday, Helen took the two sons of M. Regy, of the well-known propeller firm, for a trip over Versailles on his 100-h.p. Gnome-Nieuport.

He afterwards took Mme. Regy and Mme. Helen for a similar trip, which he concluded by a *vol plane* from a height of 1000 metres.

A Nieuport for Italy.

ON Monday, at Villacoub'ay, Gobe was testing a 100-h.p. Gnome-Nieuport, ordered by the Italian Government, and made a flight of an hour's duration with Engineer Maffei as passenger.

Victoria Louise at Munich.

WITH eight passengers on board, the Zeppelin liner, Victoria Louise, started from Friedrichshafen at 9 a.m. on October 24th, and arrived at Munich at 10.50, having covered the 112 miles in an hour and fifty minutes.

Fatal Accidents Abroad.

ON October 30th, the Bavarian officer, Lieut. Hamburger, fell 70 metres at the Oberwiesenfeld aerodrome, near Munich, and sustained fatal injuries. An Austrian officer, Lieut. Petrovitch, met with a fatal accident at Gorice, Carniola, on Tuesday last; while a French sergeant, Marechal, was killed at Houville, near Chartres, through his machine falling about 500 ft. Lieut. Poutrin, whose machine was damaged through

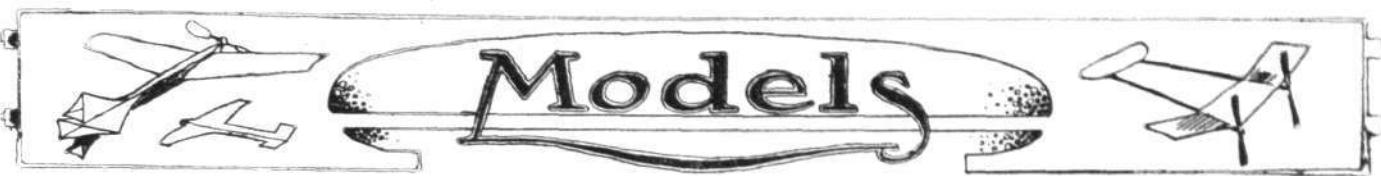
landing awkwardly when trying to avoid some soldiers at Laon several days before, died on October 21st. He had previously been decorated with the Legion of Honour.

Berlin to Paris Flight.

THE first attempt to win the prize offered for a flight from Berlin to Paris was made on the 29th ult., when Lubbe started from Johannisthal on a Rumpler monoplane and hoped to make the journey in four stages. He was, however, forced to land, owing to the wind, after flying for three hours and returned to Berlin in order to make a fresh start.

An Argentine Height Record.

EVEN down Argentine way they are beginning to make records. On October 12th Mr. George Newberry, president of the Argentine Aero Club, went up to a height of 2,400 metres, beating the height record for the republic, which had stood since September 23rd at 1,040 metres, made by Castaibert on a monoplane at the Villa Lugano aerodrome, Buenos Aires.



Edited by V. E. JOHNSON, M.A.

International Aero Exhibition, Olympia. Model Section.

ALTHOUGH the final arrangements have still to be made, it may be assumed that the general classification will be along the lines indicated in the Royal Aero Club's notice in last week's issue. One all important point was, however, omitted, and that was that the judges in awarding the prizes will take into account the general design, constructional details, and all-round performance exhibited by the machines as well as their flying capabilities, it being proposed to test them *practically* after the exhibition, before assigning the awards. Section 4 would not, of course, be so treated, unless the entrant wished it. The competitors, therefore, have to design and construct a *scientific* model. This does not mean that racing monoplanes (flying-stick type) are of necessity banned, but it does mean that a machine in which *everything*, practically speaking, has been sacrificed to its flying capabilities, i.e., its capabilities to make duration records, is not going to carry everything before it, save, of course, in Section 2 (b), and even here the designer must be careful not to sacrifice too much to such a factor. Now, although design and workmanship do not of necessity perhaps mean detail, we certainly think that competitors in Class 2 (a) and 3, as well as, of course, in Class 1, would do well to show a certain amount of detail and to produce a machine to which the term "model" can with some truth be applied. It should also be noticed that since design, &c., are to receive due weight, tractors can quite well meet in open competition machines of the loaded elevator type. Detail, of course, means very careful attention to weight, which is one reason why we laid so much stress on it in last week's issue. There will be certain minimum qualifying durations, which will be stated later, but these will not be of a too stringent character. In order to design and build scientific models, it is necessary that one should think scientifically—there are some who do this naturally, intuitively as it were—the majority do it by means of training, i.e., by cultivating the art. We trust that the series of articles which we are now writing will be of some material assistance to some of our readers in this respect. An expert judge can very quickly tell when he commences to examine a model whether it is the outcome of a scientific line of thought or the happy outcome of a very large number of models of more or less unscientific design, for this reason, the model will not be scientific, i.e., well designed "right through," there will be somewhere an error which ought to have been eliminated, and which would have been eliminated had the designer understood the "why" and "wherefore" of his work.

In section 4, scale models or part models does not of necessity mean a model or part model of a machine already in existence, but can also be applied to a *design* for a full-sized one not yet actually built.

Scientific Model Building.

II. The Strength of a Beam.

Intimately connected with the building of the *fuselage*, &c., of an aeroplane (model or otherwise) is what is known in mechanics as the strength of a beam. Apart from the material employed, the strength of a beam obviously depends not only on its length, breadth, and thickness, but also on the shape of a transverse section of the same and the manner in which the beam is loaded, i.e., whether it be uniformly loaded, &c., and also whether the ends are secured or not.

The *stiffness* of a beam is its power or capacity to resist bending or flexure. The *strength* of a beam is its capacity to withstand fracture. It is very important to distinguish between these two. For instance, the "stiffest" beam can be made from the cylindrical trunk of a pine tree 1 ft. in diameter, 6 ins. broad, and $10\frac{1}{2}$ ins. deep, whilst the "strongest" beam is 7 ins. broad and $9\frac{3}{4}$ ins. deep.

The reader should verify the following law by actual experiment with wooden rods of rectangular section of varying lengths of given sections:—Law I. *For a given section the breaking load varies inversely as the span* (beam loaded at the centre), i.e., double your length, and your beam breaks with half the load.

Law II. *The strength of a beam is proportional to its breadth*; obvious, since such a bar may be considered as two similar halves placed side by side. This law assumes, of course, that the two beams compared have the same depth and span or length, and are similarly loaded and supported.

Turning now to the question of depth, it is clear that when testing a beam placed edgewise, some means must be adopted to prevent it

turning over on its flat sides, its ends are, therefore, generally placed in vertical recesses in the supports to prevent this happening. Obviously the beam must fit loosely. On experimenting we shall find: Law III. *That the strength of a beam (rectangular section) broken flatwise is to the strength of a beam of identical span and transverse section broken edgewise, as the lesser dimensions is to the greater.* For example, a beam 20 ins. by $\frac{1}{2}$ in. by $\frac{1}{2}$ in. is four times as great as a beam 20 ins. by $\frac{1}{2}$ in. by $\frac{1}{2}$ in. when so broken although there is only twice as much material in it. The reason why a beam is stronger edgewise than flatwise is easily seen if one tries to break such a beam across one's knee—what resists the breaking is chiefly the tenacity of the wood fibres on the top or convex side of the beam—if the beam be edgewise, these fibres are further from one's knee, and therefore have a greater resisting moment than when the beam is flatwise; exactly the same thing holds when the beam is fastened at both ends and loaded at the centre. If you try further experiments with a beam supported at its two ends and loaded at its two *trisection* points instead of its one point of bisection, you will find that the bar is approximately *half as strong again as when the load is suspended from the centre*. You will also find that the fracture is equally likely to take place at any point between the two points of trisection. If the beam be uniformly loaded, you will find approximately *twice the weight* is required to what was necessary when all the load is at the centre.

If the ends of our beam instead of being left free be now firmly secured—the breaking weight may be considerably increased—in some cases even as much as doubled. Under such circumstances when fracture does occur, three fractures not unfrequently take place instead of one, this very fact explaining how the increased strength is obtained in such a case.

Taking next the case of a beam firmly fastened at one end only, the other being loaded, it will be found that such a beam is broken by about one-fourth the load necessary to fracture a similar beam supported at each end and loaded in the centre. The reader must, of course, clearly understand that the above laws are approximations and not of perfect numerical accuracy, because the laws themselves are only approximate ones. Wood, besides being of many different kinds, varies also greatly in quality, even when cut from the same piece; generally speaking, however, these differences are small, although not always so. The laws, nevertheless, do represent on the whole, really good working laws.

From such experiments as the foregoing, one naturally passes on to consider the best transverse sectional form to give the beam so as to obtain the necessary *strength* (as well as the requisite *stiffness*, if necessary) in order that we may obtain maximum strength with minimum weight—we have seen that *depth* is very desirable—but if we endeavour to bring about great depth the result will be a very thin beam—such a beam would possess too much flexibility. Now remembering that in a beam when being broken the top fibres are being compressed and the bottom torn apart, we therefore strengthen the beam by placing extra material there, and our beam takes the form of an inverted T. But in the case of say a motor rod, the compression and extension forces may interchange places, and we require more material both at the top and bottom of our T, and our beam or girder takes this form, I, i.e., an H turned over on its side.

It is more or less common knowledge that a tube of material is stronger than a solid cylinder of the same weight per unit length, but we very much question whether some of our readers have realised *how much stronger* it is, weight for weight. Taking an actual experiment a solid cylinder of iron 38 ins. long—placed on supports 3 ft. apart—when loaded at the centre with a weight of 42 lbs. bent downwards through more than 3 ins.: in the case of a square tube 1 in. by 1 in. section made of thin sheet iron and of considerably less weight, a load of 56 lbs. produces a deflection only of 0.9 in., and we find finally that such a tube can carry, without injury, a load more than twice as great as that which permanently doubled up a solid rod of wrought iron—containing considerably more weight than the tube. Why is this? It cannot be due to depth only—we must remember that the two vertical portions are no longer side by side but an inch apart, and that we have therefore this additional increase of width to take into account as well as depth. This principle is, of course, largely made use of in nature—two of the most notable instances being quills and the stalks of wheat and other plants. It is obvious that there is a limit beyond which we

cannot go—*i.e.*, the material of which the tube is made must possess sufficient thickness to produce the requisite rigidity or stiffness which every strut must possess.

The Paris Aero Exhibition. Model Section.

This section is, practically speaking, non-existent, and so far as models are concerned, we have nothing to learn from the French, the boot, as a matter of fact, being on the other leg. This we knew before we went to Paris, whither we journeyed with a view to specially studying the splendid collection of full-sized hydro-aeroplanes there exhibited, being specially desirous of contrasting the parallel or non-parallel lines along which full-sized work in France and model lines in England had progressed. About this we shall have more to say in the future. We merely state here that the result was to emphasise in a very striking manner the value of scientific model work as related to full-sized design.

The striking, the ever-predominant note of the French Show, is its *military* character. As one stands in one of the galleries, and gazes over the magnificent collection of machines there exhibited, one's eyes involuntarily rest on the grim tractors, the cruisers of the air, and we realise in a manner, impossible by any other means, that inevitable "aerial war" of the future, with respect to which France is at present all powerful. By arousing an interest in aeronautical matters where none previously existed, we sincerely hope that the study of model aeroplane (if only in the form of a minor sport), will not be without its value in aiding *our own* preparedness for the grim tussle. We trust that our readers will, for this reason if not for any other, bring FLIGHT to the notice of any young friends they may have who have not so far taken any especial interest in aviation. We say "young" because in all probability it is they who will be most affected by the matter to which we have referred.

Flight Prizes of Merit.

We hope to be able to make the first announcement of these competitions in next week's issue. Of the numerous attempts sent in there are not a few which exhibit palpable signs of hasty preparation of a mistaken idea that there is some advantage of getting in first. Such an idea is fatal to any chance of success. We take this opportunity of pointing out that the award is five shillings in money AND a certificate of merit. Now apart altogether from the monetary nature of the prize, on which, we trust, our readers will not lay *too* much stress, a certificate of merit, if it is to be of value, is not a thing to be awarded lightly; and it is our intention, if possible, to make these certificates something worth possessing, and therefore in their turn of some value to the recipient.

Club Reports.

Mr. Philip H. Hart (Hon. Sec. Croydon and District Aero Club), when sending in his first monthly report (*re* which we offer him our congratulations), asks if he sent some photos of models could space be found in FLIGHT for their reproduction? In reply, we beg to state that we shall always endeavour to do so when possible. Mr. Hart also says: "I would like to tell you that every member in the club, including myself, highly approves of the price of FLIGHT being raised to 3d. The paper has always been worth this amount and even more. I wish you every success." Many thanks for your appreciation, which we are very pleased to be able to state is only one amongst many. We may just add that the monthly reports as a whole are a great improvement to those previously sent in, especially when one considers that they are the first of their kind.

Mr. J. Dollittle's "Gnat" Tractorplane.

We give below particulars of the above model, the winner of the K. and M.A.A. Competition at Greenford on September 22nd, kindly supplied us by the designer, who is a well-known member of the Blackheath Aero Club:—

Dimensions: Length over all, 39½ ins.; length of frame, 36 ins.; length of rubber motor, 30 ins. **Chassis:** Depth, 7 ins.; wheel track 9 ins. **Tractor Screw:** 10 ins. diameter, 16-in. pitch.

Main Plane: Span, 30 ins.; chord tapers from 6 ins. at centre to 5½ ins. at tip. **Tail:** Span, 10 ins.; chord, 7½ ins. **Fin:** Length, 7½ ins.; depth, 1½ ins.

Constructional Details: The frame consists of two members; one main member, ½ in. by ½ in. to take main plane tail, &c., and one member fitted below this main member, bent to streamline shape to add to the appearance of the model, size ½ in. by ½ in.

The chassis consists of one down strut fitted 5½ ins. behind the propeller combined with a central skid of bamboo and one compression and one tension strut of 18 s.w.g. piano wire, on each side of frame. The axle for the wheels is a 16 s.w.g. cycle spoke. The wheels are 1¾ ins. diameter, weight ½ oz. each.

The rubber motor consists of 10 strands ½ in. strip rubber, and is carried above the frame.

The main plane has a flexible rear edge, is built up of two spars each 30 ins. by ½ in. by ½ in., set 3 ins. apart, with ribs ½ in. by ½ in., 3 ins. apart. It has a dihedral angle of 1½ ins. in 15 ins., and a positive angle of incidence of 1 in. in 9 ins. The maximum

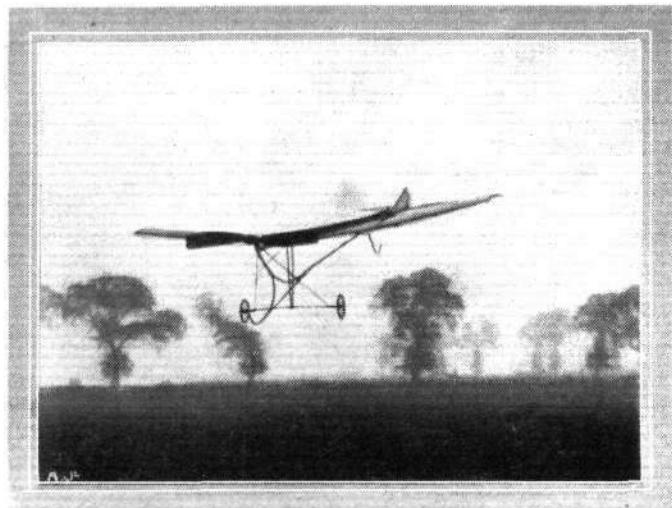
camber is situated 1½ in. behind the leading edge and is ½ in. The main plane is mounted under the main frame member and its leading edge is 10½ ins. behind the propeller. The c.g. of complete model is 12½ ins. behind the propeller.

The tail, like the rest of the model, is built largely on Antoinette lines—is made from 22 s.w.g. piano wire. It has no angle of incidence. The fin is also made from 22 s.w.g. piano wire.

The fabric used for surfacing is "Bragg-Smith aero silk."

The model flies, as near as can be seen, with the tail parallel to the flight path.

Surface areas: main plain, 172½ sq. ins.; tail, 37½ sq. ins.; fin, 6 sq. ins.—Total surface, 216 sq. ins. Weights: complete machine,



Mr. J. Dollittle's "Gnat" tractorplane, winner of the K. and M.A.A. duration and stability competition for single propeller r.o.g. tractors.

6½ ozs.; rubber, ½ oz.; ratio, 9. Longest distance to date, 220 yds. Greatest duration to date, 25 secs. A general idea of construction, &c., can be seen from the photograph. The model is suspended on cotton, the light prevailing not being good enough for a snap shot. The propeller shown in the photograph is a genuine "Helice Normale" 10-in. diameter 11-in. pitch, but owing, I think, to the low pitch, the results obtained with it have not been good."

[The flying and stability shown by this machine in the competition referred to was extremely good.—V. E. J.]

KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Hand-launched	Distance	... A. E. Woollard	... 477 yards
	Duration	... A. F. Houlberg	... 89 secs.
Off ground ...	Distance	... G. Rowlands...	... 232 yards.
	Duration	... A. F. Houlberg	... 51 secs.
Hydro, off water ...	Duration	... G. P. Bragg-Smith	... 25 secs.
Single-tractor screw, {	Distance	... H. R. Weston	... 84 yards.
hand-launched ...	Duration	... F. W. Jannaway	... 22 secs.

Official Trials—The official observers visited Wimbledon Common on Saturday, to observe the flights for the purpose of registration. The entries were not large, but the off-ground records and tractor duration were raised. The results were: Off ground, duration—A. F. Houlberg, 51 secs.; W. J. Williams, 50; L. Conolly, 39; G. Rowlands, 37; A. Brewster, 24. Off ground, distance—G. Rowlands, 232 yards. Hand-launched—A. E. Woollard, 431 yards; G. Rowlands, 154. Single tractor, hand-launched, duration—F. W. Jannaway, 22 secs. It should be noted that in all these trials deductions are made for wind velocity.

International Aero Exhibition, Olympia.—The Society of Motor Manufacturers and Traders has decided to organise an International Aero Exhibition at Olympia, under the auspices of the Royal Aero Club, in February, 1913. In connection with the Exhibition, it is proposed to organise a section for model flying machines, and the Royal Aero Club has decided to offer prizes amounting to £50. Models may be exhibited in the following classes: 1. Power-driven models (excluding rubber and spring motors). First prize, £10; second prize, £3. 2. Models driven by any other motive power. (a) Rising from the ground; minimum weight, 8 ozs. First prize, £5; second prize, £2; third prize, £1. (b) Launching by hand; minimum weight, 4 ozs. First prize, £2. 3. Hydro-aeroplane models; minimum weight, 8 ozs. First prize, £5; second prize, £2. A tank will be provided at the Exhibition in which the models will float during the Exhibition. 4. Scale models, or part models, embodying new design applicable to full-sized machines. £10 will be awarded in this class, at the discretion of the judges. 5. Model aero motor (excluding rubber and spring motors). Prize, £10. The model will be judged on a weight per horse-power basis, the ratio not to exceed 8 lbs. per h.p. The weight is to include all accessories, with fuel for a minimum run of two minutes, to be taken on a bench test. The Royal Aero Club will erect suitable stands and provide the necessary attendants. No charge will be made to exhibitors for space, but an entry fee of 5s per model will be payable. Full particulars relating to the model section will be issued later. Intending exhibitors are requested to apply to the secretary of the Royal Aero Club, 166, Piccadilly, W., or to the secretary of the Kite and Model Aeroplane Association, 27, Victory Road, Wimbledon, S.W., who are assisting the club in the model section.

27, Victory Road, Wimbledon.

W. H. AKEHURST, Hon. Sec.

MODEL CLUB DIARY AND REPORTS.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Aero-Models Assoc. (N. Branch) (15, HIGHGATE AVENUE, N.).
NOVEMBER 9th, flying at Finchley, also tests for club's duration record (holder, Mr. H. D. Murray, 69 secs.).

Hampstead Model Ae. Club (8A, MONTAGU RD., HENDON).
FIRST Tuesday each month, instruction; last Saturday each month, experimental flying. November 12th, meeting, headquarters, 8 p.m.

Hendon Model Aero Club (8, MONTAGU ROAD, W. HENDON).
NOVEMBER 9th, flying 3 p.m.; November 16th, monthly duration contest for trophy (3rd round).



CORRESPONDENCE.

* * * The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

Fenwick Memorial Fund.

[1663]. As promised in my letter recently published in FLIGHT, I append a list of the subscribers to this fund, as it may interest some of your readers. The memorial will probably take the form of a marble or bronze tablet in Harton Church, near South Shields, with a suitable inscription. Those who intend to subscribe and have not already done so, are asked to send their subscriptions without very much delay, as the fund will not remain open long:— Major B. Brooke-Popham, £1; Henry G. Melly, Esq., £1 1s.; Colonel and Mrs. A. L. Macfie, £1 11s. 6d.; the Misses Knott, £2; "F. B. M.", £1 10s.; a friend per "W. R. B.", £3 3s.; A. B. Smith, Esq. 10s. 6d.; Miss P. Earthy, 5s.; T. W. Bowler, Esq., £1; Mr. and Mrs. W. R. Binks, £3 3s.; W. A. Armstrong, Esq., 10s. 6d.; Geo. Anderson, Esq., 10s.; Miss J. I. Smith, 10s. 6d.; Foster Moore Armstrong, Esq., 10s. 6d.; A. W. S. S., 10s. 6d.; total, £17 16s.

6, Bessborough Gardens, S.W.

W. R. BINKS.

Momentum in Air.

[1664] Your correspondent, Mr. Rush, invites a reply from me as to how, in the event of a sudden calm, the aeroplane would rush on at the speed at which it had just been travelling in the face of a wind of equal velocity, whether the engine was on or off.

Of course, I was only dealing for the purpose of argument with the instant after the hypothetical calm had commenced. Obviously, with the engine cut off, head resistance and drift would soon reduce the speed of the machine unless it were allowed to adopt a gliding angle.

With regard to Mr. Von Holtorp's letter. The experiment he has devised is ingenious, but his demonstration is incorrect. In the case under discussion the air (*i.e.*, the medium from which the reaction was obtained) was supposed to become suddenly calm, and the question was whether the machine would drop like a stone or shoot forward. Let Mr. Von Holtorp reproduce the exact conditions by cutting off the current and simultaneously suddenly stopping his endless belt from which his little machine obtains its reaction, and note what happens.

Royal Aero Club.

C. PARRY WILLIAMS.

Automatic versus Inherent Stability.

[1665] One cannot doubt Mr. Earle L. Ovington's good intentions or sincerity, it was his too free use of sweeping phrases towards those who do not see eye to eye with him that, in my opinion, called for comment. I acknowledge the amendments and qualifications to such statements since contained in his letters as the due of those "legitimate workers."

While actuated by the best of intentions, such wholesale condemnation, without qualification, may do incalculable harm; for instance, he may not only discourage present, but prevent future research, in the problem attacked, or remove all chance of its ultimate accomplishment by increasing the doubts of its financial backers. This, I am sure, was not his desire, and I think he will agree that a young industry demands much more careful consideration in this respect from the authors of articles than it, as a rule, obtains.

No doubt he voiced the opinion of the majority "of those who go up in the air by planes," but not all.

That there are a good many cranks "who try to do something without knowing anything about it" no one will deny, but all inventors are not cranks, nor has automatic stability the monopoly, there are a good many still to be found elsewhere.

Leytonstone and Districts Aero Club (64, LEYSPRING ROAD).

NOVEMBER 9TH. Wanstead Flats, 3 p.m. (opposite brickfields).

Reigate, Redhill and District (8, BRIGHTON ROAD).

NOVEMBER 9TH. Flying, Earlswood Common. November 10th. "Wiggle."

Scottish Ae.S. ("ROCHELLE," LIMESIDE AVENUE, RUTHERGLEN).

NOVEMBER 9TH. Hydro-aero competition, Alexandra Park. November 16th. Monthly competition at Paisley Racecourse. November 23rd. Hydro-aero meeting, Maxwell Park. November 30th. Tractor competition sweepstakes. (Venue later.)

Windsor Model Aero Club (10, ALMA ROAD, WINDSOR).

NOVEMBER 9TH. Glider practice in Home Park.

Yorkshire Ae.C. (Model Sec.) (53, WEST STREET, LEEDS).

NOVEMBER 9TH. Poppy Field, Beeston.



Automatic and inherent stability, like Mr. Ovington's watch-dog, require testing before any definite opinion can be given as to their usefulness or reliability—personally, I am not prejudiced either way, and, as stated in my last letter, I do not consider the difficulties of a combination insurmountable. Mr. Ovington's letter has not altered that opinion.

The problem under discussion, as already stated, deserves more consideration, its importance can only be gauged by the thought that until some system is introduced whereby the strain of piloting a very large plane for a lengthy period is reduced, we shall not be able to pit it against the much-abused dirigible in a duration test, which in war, if in nothing else, means more than the bare statement can convey.

I had the pleasure of carefully examining Mr. Dunn's machine at the last Show, and was greatly interested in it, also in the scale drawings, explanations, &c., which appeared in FLIGHT. One could wish to see or hear more of it, know more of its capabilities, and its limitations.

Worthing.

FRANK W. B. HAMBLING.

Gyroscopic Force and Accidents.

[1666] I note in September 28th issue of your excellent journal a letter from Thomas Preston Brooke of this city as to the cause of the fatal accident to aviator Peck. I quite agree with Mr. Brooke that gyroscopic force was the prime cause in this accident, and, further, that a large proportion of the tragedies of aviation have been due to this cause. However, I must disagree with our distinguished fellow townsman in his past contentions that the remedy lies in producing a non-gyroscopic engine. I maintain that making all propellers "tractor" would be the best and simplest solution. Placing the propellers in front of the machine would either entirely nullify the danger, or at least so greatly minimise it that it would be more than offset by the other tremendous advantages—both as to safety and efficiency—obtaining from the use of the best types of rotary motors. As it is now any aviator who essays to drive by rotary motor any aeroplane not "tractor" had best make his funeral arrangements in advance. There are many examples which could be cited in support of my contentions. For instance, the Gallaudet monoplane, undoubtedly the finest monoplane otherwise ever produced in America, was not able to go to the start in the Gordon-Bennett Cup race because of this defect in construction, caused so many and so severe accidents during its trial flights that it was put out of the running several weeks before the time for the race. Had Mr. Gallaudet simply changed it to "tractor-screw" and fitted it with "boss" of such shape as to harmonise with the streamline form of fuselage, as with the Duperdussin, it would have proved a worthy competitor of the Duperdussins, if indeed it had not been victim over them; for in many respects it was superior to them in design. As the machine stood, however, even had it been able to go to the post, it would not have been able to finish the race, for its erratic nature would have caused it to plunge into a pylon or become the victim of some similar accident long before the completion of the race. In France, the Paulhan-Tatin *torpille* was victim of a similar defect. Although this fault was partially overcome by the fact of the machine having a rather powerful tail, and having its engine placed well to the rear, still there can be no doubt that the unnatural position of its propeller greatly militated against the continued success of this otherwise excellently designed machine. Even were all engines made non-gyroscopic, a certain danger would still be in effect with aeroplanes having propellers behind, owing to the fact that the propellers themselves generate gyroscopic tendencies. And further than that, even if the propellers could be made non-gyroscopic, these aeroplanes would still be faulty as to directional stability. I might be able to make this clear by using a sort of crude comparison; for instance, if

one were to shoot an arrow with the feathered end foremost, the flight of the missile would undoubtedly be very erratic and inefficient, even if its motive power were comparable to a non-gyroscopic engine; but if there were any gyroscopic tendencies in its propelling force, the fault of its unnatural position would be made much more serious thereby. So it may be easily imagined that the action of the "tractor-screw" in drawing behind it the more air-resisting factors of the aeroplane structure, is somewhat comparable to the true flight of an arrow where the feathered end is being dragged behind. The Deperdussin, by the way, takes still further advantage of the "arrow-feather" effect by having an unusually large and powerfully-lifting tail, which does a large share of the work of supporting the machine in the air, and at the same time helps to give this highly successful machine its great directional stability—its wonderful steadiness of flight.

So important are these principles that I am contending for, that it is not too strong a statement to say that had these principles been applied to all aeroplanes of the past and present, there would not have been one half so much loss of life. There is now a rapidly growing tendency to make even the biplanes "tractor," which is a great step toward safety and efficiency. Let us hope that in the near future there will be no propeller (not tractor) used on monoplane, biplane or otherwise, for such a consummation would undoubtedly mean the saving of many valuable lives.

Chicago, October 10th.

J. B. MCQUEENY.

Wind Estimating in Flight.

[1667] I should be interested to hear the opinion of a practical aviator or designer upon the following method of finding the velocity of the wind while in the air.

It is well known that a machine with badly-designed vertical surfaces will not fly straight across wind, but will tend to edge up into the wind, or away from it, according to whether the c.p. on the vertical surfaces is abaft or forward of the c.g. of the machine.

Suppose a machine to be deliberately designed to be unbalanced in this respect, having its c.p. for a side wind well in advance of its c.g., it will tend to fall off down wind, and will need a certain amount of rudder to keep it on its course.

The pilot notices the direction on the ground, goes up, and flies until he is flying dead against the wind. This direction can be found by the fact that the machine will fly quite straight, and will not fall off. He notes the compass-bearing and turns 4 points, that is, flying dead across the wind. He then notices the position in which the rudder has to be placed to keep the machine straight on her course. By trying this experiment in several different winds of known velocities a table can be drawn up showing the relation between the position of the rudder and the velocity of the wind, and so having standardised the machine it can always be used in this manner for determining the velocity of the wind at any height.

Cambridge.

R. M. HAINES.



The Gordon-Bennett Balloon Race.

THE victory in the balloon race for the Gordon-Bennett Trophy, which started from Stuttgart on October 27th, resulted in favour of France, M. Biernaime securing the first place with a voyage of 2,200 kiloms. to Riga, while M. Leblanc was second, with 2,050 kiloms., a few kiloms. north-east of Pouga. Both these performances beat the world's record. Mr. Honnwell in an American balloon, was third, with 1,700 kiloms., while the British representative, Mr. Francia, finished ninth, with 1,200 kiloms. There were nineteen competitors, and Mr. Watts, the American competitor, whose balloon was damaged, started *hors concours* in a German balloon, Dusseldorf II. He landed at Pskoff, Russia.

Successes of the Mercedes Motor.

THE Rumpler monoplane, which, piloted by Hellmuth Hirth, was the only machine, apart from the military ones, to complete the South German circuit in the specified time, was fitted with a 95-h.p. 6-cylinder Mercedes motor. It was on a machine similarly equipped that Hirth secured his successes in the Berlin-Vienna race, the Upper Rhine Meeting and other German competitions.

The Accident to Hart in Australia.

SOME particulars are now to hand from Australia regarding the accident to Mr. W. Hart, at Richmond, New South Wales, on September 4th. It appears that Mr. Hart was testing the new monoplane he has built, and during the third flight, while at a height of 200 ft., the motor stopped. The machine then dived to the earth, and the crash was so great that the engine was buried in the ground. The pilot remained in his seat, but suffered very seriously, there being compound fracture of the right knee-cap and compound fracture of the left leg, while there were serious injuries to the head. He was taken at once to the hospital, and although the doctors at first despaired of saving his life, his sturdy constitution and cheery disposition will probably succeed in pulling him through.

AERONAUTICAL SOCIETY OF GREAT BRITAIN.

Official Notices.

Aeronautical Examination.—The Council have under consideration a proposal that an elementary examination in aeronautics be instituted by the Society. Before proceeding further in the matter the Council would be glad to receive notification from anyone who would be desirous of sitting for such examination. Letters should be sent to the Secretary, at 11, Adam Street, Adelphi, W.C.

Meetings.—The first general meeting of the Society for this session will be held on Wednesday, November 13th, at 8.30 p.m., at the Royal United Service Institution, Whitehall, when General Sir Horace Smith-Dorrien, K.C.B., will preside. Mr. A. E. Berriman, A.F.Ae.S., will read a short paper, to be followed by a discussion on "Aeroplanes in the Light of the Military Trials." Leading constructors, military officers and others have promised to attend.

Members are requested to note that under the rules they are permitted to introduce visitors to general meetings. November 27th, Wednesday, 8.30 p.m., Royal United Service Institution, Brig.-Gen. F. G. Stone, R.A. "Aircraft as Targets for the Artillery."

Wilbur Wright Memorial Fund.—The following subscriptions have been received:—Amount previously acknowledged, £530 14s. 11d.; Lieut. C. J. Randall, £1 1s.; Leeds University Engineering Society, £1 10s. Total £533 5s. 11d.

Gift to the Library.—The Council desires to thank Capt. H. F. Wood for the gift of about forty lantern slides.

BERTRAM G. COOPER, Secretary.



Flying Over Pekin.

EVEN the forbidden city has had to succumb to the aeroplane, as on last Sunday afternoon Kumenski, the Russian pilot of a Blériot machine, three times circled above Pekin, passing over the Tartar, Imperial and Forbidden sections. Practically the whole city turned out to watch the aviator.



NEW COMPANY REGISTERED.

Aerial Navigation, Ltd., 13, Copthall Avenue, E.C.—Capital £10,000, in 9,000 ordinary shares of £1 each and 20,000 deferred shares of 1s. each.

PUBLICATIONS RECEIVED.

Sovereignty Over the Air. By Sir H. Erle Richards, K.C., &c. Oxford: The Clarendon Press. Price 1s. 6d. net.

Draughtsman's Measurements; Complete Conversion Tables. The United Motor Industries, Ltd., 45, 46, Poland Street, W.

Catalogues.

"Gnomol" Castor Oil. The General Aviation Contractors, Ltd., 30, Regent Street, S.W.

"Anzani" Aero Engines. The General Aviation Contractors, Ltd., 30, Regent Street, S.W.



Aeronautical Patents Published.

Applied for in 1911.

Published November 7th, 1912.

22,260. T. W. K. CLARKE AND V. E. JOHNSON. Stability device.
22,809. PLANES, LTD. AND R. C. FENWICK. Flying machines.
22,820. L. A. VERDET. Rotary explosion motors.

23,271. F. W. LANCHESTER. Stabilization of flying machines.

Applied for in 1912.

Published November 7th, 1912.

1,674. E. BOUCHAUD-PRACEIQ. Aerial propulsion.

7,711. F. SCHERRER. Portable hangar for airships.

13,867. P. POULALION AND J. ARMANGE. Aerial deviation indicators.

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